



United States  
Department of  
Agriculture



NRCS

Natural  
Resources  
Conservation  
Service

In cooperation with  
Oklahoma Agricultural  
Experiment Station and  
Oklahoma Conservation  
Commission

# Soil Survey of Logan County, Oklahoma







# How To Use This Soil Survey

## General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

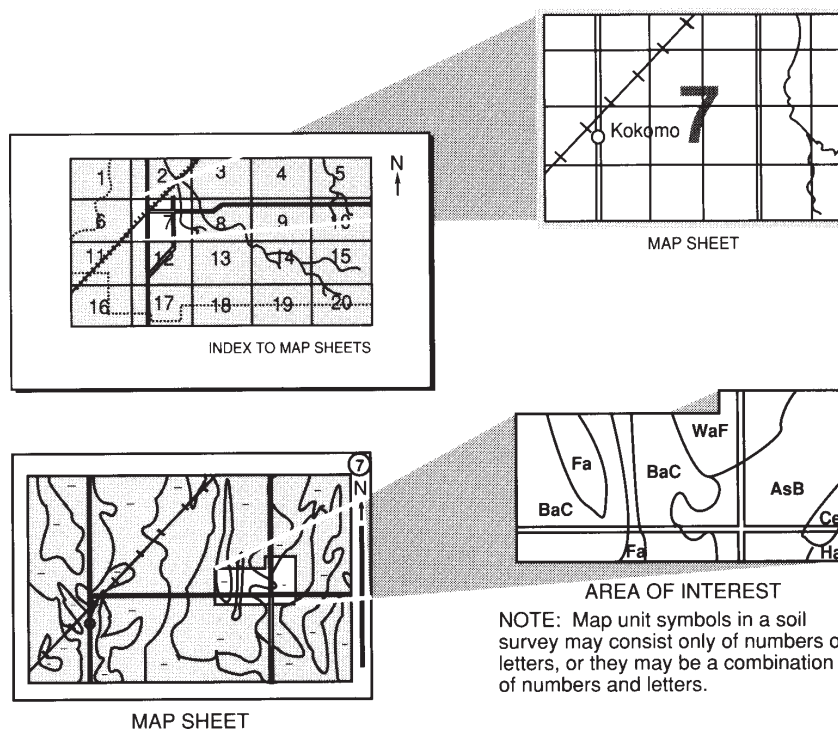
## Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and go to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1994. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service, the Oklahoma Agricultural Experiment Station, and the Oklahoma Conservation Commission. It is part of the technical assistance furnished to the Logan County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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**Cover: Wheat-alfalfa crop rotation on Lawrie loam, 0 to 1 percent slopes, rarely flooded, near Langston, Oklahoma.**

*Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.*

# Contents

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<b>Cover</b> .....	i
<b>How To Use This Soil Survey</b> .....	iii
<b>Contents</b> .....	v
<b>Summary of Tables</b> .....	xi
<b>Foreword</b> .....	xiii
<b>Introduction</b> .....	1
General Nature of the Survey Area .....	2
History .....	2
Physiography and Drainage .....	3
Natural Resources .....	4
Climate .....	5
<i>Table—Temperature and Precipitation</i> .....	6
<i>Table—Freeze Dates in Spring and Fall</i> .....	7
<i>Table—Growing Season</i> .....	7
How This Survey Was Made .....	8
<b>General Soil Map Units</b> .....	11
1. OK079—Gracemore-Gaddy-Goodnight (Yahola-Gaddy) .....	11
2. OK086—Grainola-Lucien-Renfrow (Grainola-Masham-Ironmound) .....	13
3. OK094—Kirkland-Renfrow-Zaneis (Kirkland-Renfrow) .....	15
4. OK112—Port-Pulaski-Ashport (Ashport-Pulaski-Lawrie) .....	16
5. OK116—Renfrow-Kirkland-Grainola (Grainola-Renfrow-Piedmont) .....	18
6. OK121—Teller-Konawa-Norge (Teller-Navina-Konawa) .....	20
7. OK141—Dougherty-Eufaula (Dougherty-Konawa-Derby) .....	21
8. OK151—Stephenville-Darnell-Newella (Stephenville-Darsil-Harrah) .....	23
9. OK225—Coyle-Ironmound-Zaneis (Coyle-Ironmound-Zaneis) .....	25
<b>Detailed Soil Map Units</b> .....	29
<i>Table—Acreage and Proportionate Extent of the Soils</i> .....	31
AspA—Ashport silt loam, 0 to 1 percent slopes, occasionally flooded .....	33
AstA—Ashport silt loam, 0 to 1 percent slopes, frequently flooded .....	33
BetA—Bethany silt loam, 0 to 1 percent slopes .....	35
BetB—Bethany silt loam, 1 to 3 percent slopes .....	36
BocA—Bocox loamy fine sand, 0 to 1 percent slopes .....	37
BtlA—Bathel loamy sand, 0 to 1 percent slopes .....	37
CaaA—Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded .....	38
CAID—Coyle-Ashport-Ironmound complex, 1 to 8 percent slopes .....	39
CoIC2—Coyle-Ironmound complex, 3 to 5 percent slopes, eroded .....	42
CoUB—Coyle-Urban land complex, 1 to 3 percent slopes .....	43
CoUC—Coyle-Urban land complex, 1 to 5 percent slopes .....	45
CoyB—Coyle loam, 1 to 3 percent slopes .....	46
CoyC2—Coyle loam, 3 to 5 percent slopes, eroded .....	47
CoZC3—Coyle and Zaneis soils, 3 to 5 percent slopes, severely eroded .....	48
DAM—Dam .....	50
DerB—Derby loamy fine sand, 0 to 3 percent slopes .....	50
DerD—Derby loamy fine sand, 3 to 8 percent slopes .....	51

DerE—Derby loamy fine sand, 8 to 15 percent slopes .....	52
DiRG—Darsil-Rock outcrop complex, 15 to 45 percent slopes .....	53
DouB—Dougherty loamy fine sand, 0 to 3 percent slopes .....	54
DouD—Dougherty loamy fine sand, 3 to 8 percent slopes .....	55
DUM—Dumps .....	56
EasA—Easpur loam, 0 to 1 percent slopes, occasionally flooded .....	56
GadA—Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded .....	57
GaGA—Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded ....	58
GMGE4—Grainola-Masham-Gullied land complex, 5 to 15 percent slopes .....	59
GMLG—Grainola-Masham-Lucien complex, 5 to 40 percent slopes, very bouldery .....	61
GohC—Goodnight loamy fine sand, 1 to 5 percent slopes .....	63
GohE—Goodnight loamy fine sand, 5 to 15 percent slopes .....	64
GooE—Goodnight fine sand, 1 to 15 percent slopes .....	64
GooG—Goodnight fine sand, 15 to 45 percent slopes .....	65
GraC—Grainola silty clay loam, 3 to 5 percent slopes .....	66
GraD2—Grainola silty clay loam, 5 to 8 percent slopes, eroded .....	67
GrHC—Grant-Huska complex, 1 to 5 percent slopes .....	68
GrIE—Grainola-Ironmound complex, 3 to 12 percent slopes .....	69
GrLE—Grainola-Lucien complex, 5 to 12 percent slopes .....	71
HaGD4—Harrah-Gullied land complex, 5 to 8 percent slopes .....	72
HarC—Harrah fine sandy loam, 3 to 5 percent slopes .....	73
HarC2—Harrah fine sandy loam, 3 to 5 percent slopes, eroded .....	74
HarG—Harrah fine sandy loam, 3 to 45 percent slopes .....	75
HawB—Hawley loamy fine sand, 0 to 3 percent slopes, rarely flooded .....	76
ICGD3—Ironmound-Coyle-Grainola complex, 5 to 8 percent slopes, severely eroded .....	77
IrCE—Ironmound-Coyle complex, 5 to 15 percent slopes .....	78
IroC2—Ironmound loam, 3 to 5 percent slopes, eroded .....	80
KgfB—Kingfisher silt loam, 1 to 3 percent slopes .....	81
KinC2—Kingfisher loam, 3 to 5 percent slopes, eroded .....	81
KonB—Konawa loamy fine sand, 0 to 3 percent slopes .....	82
KonD2—Konawa loamy fine sand, 3 to 8 percent slopes, eroded .....	83
KrdA—Kirkland silt loam, 0 to 1 percent slopes .....	85
KrkB—Kirkland silty clay loam, 1 to 3 percent slopes .....	85
LarA—Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded .....	86
LawA—Lawrie loam, 0 to 1 percent slopes, rarely flooded .....	87
LerA—Lebron clay, 0 to 1 percent slopes, occasionally flooded .....	88
LitB—Littleaxe fine sandy loam, 1 to 3 percent slopes .....	89
LitC2—Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded .....	90
M-W—Miscellaneous water .....	91
MaID—Masham-Ironmound complex, 5 to 15 percent slopes .....	91
MaIG—Masham-Ironmound complex, 15 to 40 percent slopes .....	93
MinB—Minco very fine sandy loam, 1 to 3 percent slopes .....	94
MinC—Minco very fine sandy loam, 3 to 5 percent slopes .....	95
MinD—Minco very fine sandy loam, 5 to 8 percent slopes .....	96
MinF—Minco very fine sandy loam, 8 to 20 percent slopes .....	97
MIIA—Miller silty clay, 0 to 1 percent slopes, occasionally flooded .....	98
MulC—Mulhall loam, 3 to 5 percent slopes .....	99
MulC2—Mulhall loam, 3 to 5 percent slopes, eroded .....	100
NavA—Navina fine sandy loam, 0 to 1 percent slopes .....	101
NavB—Navina fine sandy loam, 1 to 3 percent slopes .....	102
NeGD4—Newalla-Gullied land complex, 3 to 8 percent slopes .....	103
NewB—Newalla fine sandy loam, 1 to 3 percent slopes .....	104



NorA—Norge silt loam, 0 to 1 percent slopes .....	105
NorB—Norge silt loam, 1 to 3 percent slopes .....	106
NorC2—Norge silt loam, 3 to 5 percent slopes, eroded .....	106
OWHD—Oil waste land-Huska complex, 1 to 8 percent slopes .....	107
PieB—Piedmont silty clay loam, 1 to 3 percent slopes .....	109
PieC2—Piedmont silty clay loam, 3 to 5 percent slopes, eroded .....	110
PIT—Pits .....	110
PukA—Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded .....	111
PulA—Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded .....	112
RenB—Renfrow silt loam, 1 to 3 percent slopes .....	113
RenC—Renfrow silt loam, 3 to 5 percent slopes .....	114
RewC2—Renfrow silty clay loam, 3 to 5 percent slopes, eroded .....	115
RinB—Renthin silt loam, 1 to 3 percent slopes .....	116
RnnC2—Renthin silty clay loam, 3 to 5 percent slopes, eroded .....	117
SDGD4—Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes .....	118
SDND—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes .....	119
SDND2—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded .....	121
SlaB—Slaughterville fine sandy loam, 1 to 3 percent slopes .....	123
SlaD—Slaughterville fine sandy loam, 3 to 8 percent slopes .....	124
SlaF—Slaughterville fine sandy loam, 8 to 20 percent slopes .....	125
StDC—Stephenville-Darsil complex, 1 to 5 percent slopes .....	126
StDC2—Stephenville-Darsil complex, 1 to 5 percent slopes, eroded .....	127
StDE—Stephenville-Darsil complex, 5 to 15 percent slopes .....	128
SteB—Stephenville fine sandy loam, 1 to 3 percent slopes .....	130
SteC2—Stephenville fine sandy loam, 3 to 5 percent slopes, eroded .....	131
SUND—Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes .....	132
TelB—Teller loam, 1 to 3 percent slopes .....	133
TelC2—Teller loam, 3 to 5 percent slopes, eroded .....	134
TriA—Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded .....	135
URB—Urban land .....	136
W—Water .....	136
YaaA—Yahola loam, 0 to 1 percent slopes, occasionally flooded .....	137
YahA—Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded .....	138
ZaHC—Zaneis-Huska complex, 3 to 5 percent slopes .....	139
ZanB—Zaneis loam, 1 to 3 percent slopes .....	140
ZanC—Zaneis loam, 3 to 5 percent slopes .....	141
ZanC2—Zaneis loam, 3 to 5 percent slopes, eroded .....	142
<b>Use and Management of the Soils .....</b>	<b>143</b>
Agronomy .....	143
Land Capability Classification .....	144
<i>Table—Land Capability and Yields per Acre of Crops and Pasture</i> .....	145
Estimated Yields of Crops and Pasture .....	154
Cropland Limitations and Hazards .....	154
<i>Table—Cropland Limitations and Hazards</i> .....	157
Prime Farmland .....	167
<i>Table—Prime Farmland</i> .....	168
Range .....	169
<i>Table—Rangeland Productivity and Characteristic Plant Communities</i> .....	172
Similarity Index .....	192
Rangeland Management .....	192
Ecological Sites .....	193
Windbreaks and Environmental Plantings .....	196
<i>Table—Windbreaks and Environmental Plantings</i> .....	198

Recreation .....	212
<i>Table—Recreational Development, Part I</i> .....	214
<i>Table—Recreational Development, Part II</i> .....	226
Engineering .....	235
Sanitary Facilities .....	235
<i>Table—Sanitary Facilities, Part I</i> .....	238
<i>Table—Sanitary Facilities, Part II</i> .....	251
Building Site Development .....	261
<i>Table—Building Site Development, Part I</i> .....	263
<i>Table—Building Site Development, Part II</i> .....	273
Construction Materials .....	287
<i>Table—Construction Materials, Part I</i> .....	289
<i>Table—Construction Materials, Part II</i> .....	298
Water Management .....	313
<i>Table—Water Management</i> .....	314
Agricultural Waste Management .....	324
<i>Table—Agricultural Waste Management, Part I</i> .....	327
<i>Table—Agricultural Waste Management, Part II</i> .....	347
<b>Soil Properties</b> .....	367
Engineering Index Properties .....	367
<i>Table—Engineering Index Properties</i> .....	369
Engineering Index Test Data .....	413
<i>Table—Engineering Index Test Data of Selected Soils</i> .....	414
Physical Properties .....	415
<i>Table—Physical Properties of the Soils</i> .....	418
Physical Analyses of Selected Soils .....	438
<i>Table—Physical Properties of Selected Soils</i> .....	439
Chemical Properties .....	444
<i>Table—Chemical Properties of the Soils</i> .....	445
Chemical Analyses of Selected Soils .....	460
<i>Table—Chemical Properties of Selected Soils</i> .....	461
Water Features .....	466
<i>Table—Water Features</i> .....	468
Soil Features .....	480
<i>Table—Soil Features</i> .....	481
<b>Classification of the Soils</b> .....	487
<i>Table—Classification of the Soils</i> .....	488
Soil Series and Their Morphology .....	489
Ashport Series .....	489
Bathel Series .....	491
Bethany Series .....	494
Bocox Series .....	497
Canadian Series .....	499
Coyle Series .....	501
Darsil Series .....	504
Derby Series .....	505
Dougherty Series .....	507
Easpur Series .....	509
Gaddy Series .....	511
Goodnight Series .....	512
Gracemore Series .....	513
Grainola Series .....	515
Grant Series .....	517
Harrah Series .....	519

Hawley Series .....	521
Huska Series .....	522
Ironmound Series .....	524
Kingfisher Series .....	526
Kirkland Series .....	528
Konawa Series .....	532
Lawrie Series .....	535
Lebron Series .....	538
Littleaxe Series .....	540
Lucien Series .....	542
Masham Series .....	544
Miller Series .....	545
Minco Series .....	547
Mulhall Series .....	548
Navina Series .....	551
Newalla Series .....	553
Norge Series .....	556
Piedmont Series .....	558
Pulaski Series .....	560
Renfrow Series .....	562
Renthin Series .....	564
Slaughterville Series .....	567
Stephenville Series .....	568
Teller Series .....	570
Tribbey Series .....	572
Yahola Series .....	573
Zaneis Series .....	575
<b>Formation of the Soils .....</b>	<b>579</b>
Factors of Soil Formation .....	579
Climate .....	579
Living Organisms .....	579
Topography .....	579
Parent Material .....	580
Time .....	580
Geology .....	580
<b>References .....</b>	<b>585</b>
<b>Glossary .....</b>	<b>587</b>





## Summary of Tables

---

Temperature and Precipitation .....	6
Freeze Dates in Spring and Fall .....	7
Growing Season .....	7
Acreage and Proportionate Extent of the Soils .....	31
Land Capability and Yields Per Acre of Crops and Pasture .....	145
Cropland Limitations and Hazards .....	157
Prime Farmland .....	168
Rangeland Productivity and Characteristic Plant Communities .....	172
Windbreaks and Environmental Plantings .....	198
Recreational Development, Part I .....	214
Recreational Development, Part II .....	226
Sanitary Facilities, Part I .....	238
Sanitary Facilities, Part II .....	251
Building Site Development, Part I .....	263
Building Site Development, Part II .....	273
Construction Materials, Part I .....	289
Construction Materials, Part II .....	298
Water Management .....	314
Agricultural Waste Management, Part I .....	327
Agricultural Waste Management, Part II .....	347
Engineering Index Properties .....	369
Engineering Index Test Data of Selected Soils .....	414
Physical Properties of the Soils .....	418
Physical Properties of Selected Soils .....	439
Chemical Properties of the Soils .....	445
Chemical Properties of Selected Soils .....	461
Water Features .....	468
Soil Features .....	481
Classification of the Soils .....	488



# Foreword

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This soil survey contains information that can be used in land-planning programs in Logan County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

M. Darrel Dominick  
State Conservationist  
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# Soil Survey of Logan County, Oklahoma

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Fieldwork by R. Clay Wilson, Carl E. Woods, Jr., and Don Gastino, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,  
in cooperation with  
Oklahoma Agricultural Experiment Station and Oklahoma Conservation Commission

LOGAN COUNTY is located in central Oklahoma (fig. 1). It has an area of about 479,418 acres, or 749 square miles. The population of the county is about 29,000. Guthrie, the county seat, is located in the central part of the county and has a population of 10,500. Guthrie Lake, Liberty Lake, and other bodies of water larger than 40 acres in size make up about 999 acres. Logan County is bounded on the north by Garfield, Noble, and Payne Counties, on the east by Lincoln and Payne Counties, on the south by Oklahoma County, and on the west by Kingfisher County.

About 27 percent of Logan County is cropland, 13 percent is pastureland, 40 percent is rangeland, 12 percent is woodland, 7 percent is urban land and roads, and 1 percent is water. About 21 percent of the county is prime farmland.

The eastern one-third of Logan County is rolling and hilly uplands with long, narrow, very gently sloping to moderately sloping summits. The drainage system deeply dissects the uplands, forming broad, gently sloping to steep side slopes with narrow flood plains. The native vegetation consists of a savannah of post oak and blackjack oak with an understory of tall and mid grasses. The main agricultural enterprise is cattle production. Cattle are grazed mainly on native grasses and some improved pastureland. In these areas, cultivated cropland is on narrow flood plains and a few summits. Alfalfa, wheat, and grain sorghum are the main cultivated crops.

The western two-thirds of the county consists of nearly level to rolling uplands with broad, nearly level and very gently sloping summits. The drainage system dissects the uplands, forming the long, broad, gently sloping to moderately steep side slopes with wide flood plains. Steep rock escarpments in some areas break the side slopes from the flood plains on many of the major streams. The native vegetation consists of mid and tall rangeland grasses. The main agricultural enterprises are cattle and wheat production. Cattle are grazed mainly on native grasses and some improved pastureland on the side slopes. Wheat and grain sorghum are grown on the summits and gently sloping side slopes. Wheat, grain sorghum, and alfalfa are grown on the wide flood plains.

This soil survey updates the survey of Logan County published in 1960 (6). It provides additional information and has larger maps, which show the soils in greater detail.

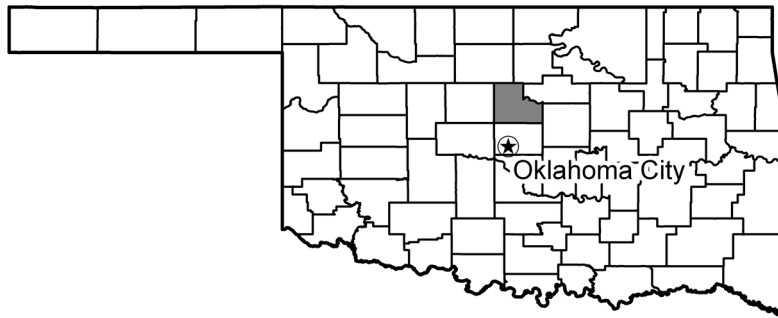


Figure 1.—Location of Logan County in Oklahoma.

## General Nature of the Survey Area

This section gives general information about Logan County. It discusses the history, physiography and drainage, natural resources, and climate of the survey area.

### History

Prior to settlement by European immigrants, Native Americans used the survey area as hunting grounds. The survey area was first settled in 1889, when unassigned lands of the Indian Territory were opened to non-Indian settlement by Presidential proclamation. Fifteen of eighteen townships were settled at that time. Three other townships were settled in 1891, when Iowa, Sac and Fox, Kickapoo, and Pottawatomie Indian lands were opened to homesteading.

The Organic Act of 1890 provided territorial government in the form of county, township, and city governments. Prior to that time, communities elected their own government and relied on United States marshals for law enforcement. Logan County was named in honor of Senator John Logan of Illinois, who was a Union General in the Civil War. Guthrie was designated by the Act as the county seat and territorial capitol.

The first 50 years of agriculture in the survey area were generally exploitive. Row crops were grown until fields became eroded and depleted of nutrients. Most fields were cropped with little or no management for the prevention of erosion. Topsoil quickly eroded, and fields were permanently damaged. Damaged fields were abandoned and allowed to return to native vegetation. In the late 1920's, agriculture began to change from row crops to close-growing small grains. Today, continuous small grain production is the dominant cropping system in Logan County. The majority of agricultural lands in Logan County are managed for native grassland, pastureland, and hayland for use in cattle production.

Langston University was authorized by the Oklahoma Territorial Legislature on March 12, 1897. The legislature named the University the "Colored Agriculture and Normal University of Oklahoma." The citizens of Langston supported the new university by securing faculty, land, and funds with the goal of providing instruction in the art of teaching and in the agricultural, mechanical, and industrial arts. In 1941, the university was renamed Langston University after John Mercer Langston (1829-1897), a distinguished educator and member of Congress. Today, Langston University provides education in agriculture as well as many other fields.

In 1929, the Red Plains Experiment Station was established by the Buchanan Amendments of 1929. The primary objectives of the station were to measure soil erosion and determine methods for controlling erosion. The Red Plains Experiment Station was significant in developing conservation practices that are still used today.

In 1938, the Cottonwood Creek Soil Conservation District was formed. The

Cottonwood Creek Soil Conservation District was later named the Logan County Conservation District. The Logan County Conservation District has sponsored three watershed projects. The district is actively taking part in the conservation of natural resources in Logan County.

## **Physiography and Drainage**

Logan County is within two different major land resource areas (MLRAs). The eastern one-third of the county is in the Northern Cross Timbers Major Land Resource Area (MLRA 84A), and the western two-thirds is in the Central Rolling Red Prairies Major Land Resource Area (MLRA 80A).

The physiography of Logan County is strongly influenced by the drainage patterns of the Cimarron River, along with those of Bear Creek, Beaver Creek, Cottonwood Creek, and Skeleton Creek. Beaver, Cottonwood, and Skeleton Creeks drain into the Cimarron River. Bear Creek is a tributary of the Deep Fork River. The Cimarron River drains eastward, Cottonwood Creek drains northeastward, and Beaver, Skeleton, and Bear Creeks drain to the southeast. The entire county is within the Arkansas River drainage system.

Surface features within the Northern Cross Timbers MLRA include both uplands and flood plains. The uplands are characterized by moderate to prominent relief with narrow, very gently sloping to sloping, convex summits and shoulders and broad, sloping to steep backslopes. The summits are capped (and maintained) by erosion-resistant sandstones. The landscape is deeply dissected, and heads of drainageways may incise the sandstone summits. Where streams join, narrow flood plains form. The native vegetation consists of a savannah of post oak and blackjack oak with an understory of mid and tall grasses. Long and narrow, native grass prairies associated with calcareous shale outcrops occur in areas of prominent relief.

Flood plains within the northern one-third of the Northern Cross Timbers MLRA are associated with minor streams, particularly Fitzgerald, Soldier, and Walnut Creeks, which drain north into the Cimarron River. Streams within the southern two-thirds of the Northern Cross Timbers MLRA, including Bear, Coon, and Falls Creeks, drain to the southeast. These nearly level flood plains are flanked by very gently undulating natural levees. Soils in the upper part of the drainage system frequently have a high water table. The native vegetation consists of prairie grasses with a few scattered bottomland hardwood trees.

Surface features within the Central Rolling Red Prairies MLRA include uplands, uplands mantled with ancient terrace treads, risers and treads on stream terraces, dune fields, and flood plains. Upland landscapes occur in the central part of the county and are characterized by low or moderate relief with smooth, very gently sloping to sloping, convex summits, shoulders, and backslopes. Summits are typically capped (and maintained) by erosion-resistant sandstones. Soil parent materials include sandstones, siltstones, mudstones, and shales as well as alluvial and eolian sediments. The landscape is dissected by long, narrow drainageways, and heads of drainageways may incise and dissect the sandstone summits. The native vegetation consists of prairie grasses and forbs.

Uplands mantled with ancient terrace treads occur in the extreme northwestern part of Logan County and on the high divide along the interfluvium between the Cimarron River and Cottonwood Creek in the southwestern part of the county. These low-relief landforms are characterized by smooth, nearly level to gently sloping, slightly convex to slightly concave summits, convex shoulders, and convex backslopes. Drainageways that dissect this area are long and narrow and create a very gently rolling landscape. The native vegetation consists of prairie grasses and forbs.

Riser and tread positions on stream terraces are associated with the Cimarron River and its major tributaries, including Cottonwood, Skeleton, and Beaver Creeks.

The terrace treads and risers are characterized by low or moderate relief. Tread positions are smooth, slightly convex to slightly concave, and nearly level or very gently sloping. Riser positions are very gently sloping to sloping and have a convex slope shape. Drainageways that dissect this area are long and narrow and create a gently rolling landscape. The native vegetation consists of prairie grasses and forbs.

Dunes are associated with sandy treads and risers that have been reworked by the wind on stream terraces of the Cimarron River. The dunal area is north of the Cimarron River in the west-central part of the county and is characterized by low or moderate relief. Undulating to rolling dunes blanket nearly level treads and sloping risers on (generally) the lowest stream terrace levels. Drainageways that dissect this area are long and narrow and create a gently rolling landscape. The soils within the drainageways have a high water table. The native vegetation consists of an oak savannah.

Flood plains of the Central Rolling Red Prairies MLRA are associated with Beaver Creek and Skeleton Creek to the north, Cottonwood Creek to the south, and the Cimarron River in the central part of the county. The general direction of drainage is eastward. The nearly level flood plains of Beaver, Skeleton, and Cottonwood Creeks are characterized by low relief with very gently undulating natural levees and are dissected by perennial and intermittent streams. Natural vegetation consists of prairie grasses with a few scattered bottomland hardwood trees. The nearly level flood plain of the Cimarron River is also characterized by low relief with gently undulating natural levees and depressions in some areas where water can pond. The landscape is interrupted by long linear sand dunes that parallel the river channel. The native vegetation consists of prairie grasses with scattered bottomland hardwoods.

The lowest point in Logan County is about 850 feet above sea level and is within the Cimarron River drainage system in the eastern part of the county. The highest point, 1,280 feet above sea level, is south of the town of Guthrie on the divide between the drainage systems of the Cimarron and North Canadian Rivers.

## **Natural Resources**

The mineral and water resources of Logan County are important to the overall development and progress of the county. Petroleum production is by far the most important mineral-related commercial activity. In 1993, petroleum production in Logan County amounted to about 1.1 million barrels of crude oil (valued at nearly \$18.7 million) and about 12 billion cubic feet of natural gas (valued at \$22.6 million). Due to these production levels, Logan County ranks near the middle of the petroleum-producing counties in Oklahoma.

Sand and gravel have been produced from a number of sites in the alluvial and terrace deposits of the county. Some of the sandstone and siltstone beds may locally be suitable for use as building and fill material.

Abundant quantities of good-quality ground water occur in Quaternary alluvial and terrace deposits as well as in the extremely important Garber-Wellington aquifer that underlies much of the southern part of the county. The Garber-Wellington aquifer covers permeable sandstone layers of both the entire Garber Sandstone section and the upper part of the underlying Wellington Formation. The saturated thickness of this aquifer ranges from about 500 to 700 feet.

Water wells in the Garber-Wellington aquifer commonly yield 25 to 100 gallons per minutes (GPM) of fresh water that contains only 200 to 500 milligrams per liter (Mg/L) of dissolved solids. The aquifer is recharged by precipitation and runoff that percolates down through the soil into the porous and permeable sandstones of the Garber Sandstone and the Wellington Formation. Ground water then percolates slowly downward and/or laterally dips down (westward) within the sandstone layers. The aquifer water is salty in the lower part of the Wellington Formation and farther west



where the Garber Sandstone extends beneath Kingfisher County (refer to the east-west cross section of the surface geology map). Where the Garber Sandstone and the Wellington Formation crop out, ground water generally is found in any permeable sandstone bed at or below the ground-water surface. Farther west, where the relatively impermeable Hennessey Group overlies the Garber Sandstone, wells still must be drilled down into the water-bearing sands of the Garber-Wellington aquifer. Upon encountering a fresh-water sand, the water will be forced up the drill hole several hundred feet under artesian pressure to the potentiometric surface, approximately 100 to 200 feet below the land surface. Since the Garber Sandstone and the Wellington Formation are more shaley to the north, the yield of the aquifer decreases northward across the county. Fresh water still occurs in the sands (the same as it does farther south), but the sands are less abundant and the yields typically are 5 to 40 GPM.

Water wells in alluvial and terrace deposits locally yield 25 to 50 GPM, while wells in the prolific Cimarron River terrace aquifer in the west-central part of the county yield 150 to 700 GPM. The water quality in most of these aquifers includes 300 to 1,000 Mg/L of dissolved solids (3, 4).

See the "Geology" section for more information on the geologic formations in the survey area.

## **Climate**

Logan County is hot in summer but cool in winter, when an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. Rainfall is uniformly distributed throughout the year, reaching a slight peak in spring. Snowfalls are infrequent. Annual total precipitation is normally adequate for cotton, feed grains, and small grains.

The table "Temperature and Precipitation" gives data on temperature and precipitation for the survey area as recorded at Guthrie, Oklahoma, in the period 1951 to 1990. The table "Freeze Dates in Spring and Fall" shows probable dates of the first freeze in fall and the last freeze in spring. The table "Growing Season" provides data on the length of the growing season.

In winter, the average temperature is 39 degrees F and the average daily minimum temperature is 28 degrees. The lowest temperature on record, which occurred at Guthrie on December 23, 1989, is -13 degrees. In summer the average temperature is 93 degrees. The highest recorded temperature, which occurred on August 21 1981, is 112 degrees.

Growing degree days are shown in the table "Temperature and Precipitation." They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

## Temperature and Precipitation

(Data recorded in the period 1951-1990 at Guthrie, Oklahoma)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snow- fall
				Maximum temp. higher than--	Minimum temp. lower than--			Less than--	More than--		
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	48.6	24.9	36.8	75	-2	23	1.04	0.19	1.69	2	2.4
February--	54.0	29.3	41.7	80	3	41	1.58	0.45	2.46	4	2.0
March----	63.2	37.6	50.4	89	13	145	2.61	0.81	4.06	5	0.8
April----	73.9	48.7	61.3	92	26	350	2.59	1.01	3.89	5	0.0
May-----	81.4	57.7	69.6	95	37	608	5.16	1.91	7.73	7	0.0
June-----	89.5	66.5	78.0	102	50	840	4.10	1.69	5.97	6	0.0
July-----	95.3	70.9	83.1	108	56	1,026	2.59	0.62	4.06	4	0.0
August---	94.9	69.6	82.3	107	54	1,001	2.39	0.92	3.59	4	0.0
September	86.5	61.9	74.2	103	40	726	3.99	1.26	6.23	5	0.0
October--	75.5	50.0	62.8	94	28	397	2.95	0.71	4.63	4	0.0
November-	61.7	37.8	49.8	81	15	104	2.01	0.39	3.21	4	0.2
December-	51.4	28.3	39.9	75	0	37	1.40	0.41	2.12	3	1.2
Yearly:											
Average-	73.0	48.6	60.8	---	---	---	---	---	---	---	---
Extreme-	---	---	---	109	-5	---	---	---	---	---	---
Total---	---	---	---	---	---	5,298	32.41	25.77	39.51	53	6.6

\* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

## Freeze Dates in Spring and Fall

(Data recorded in the period 1951-1990 at Guthrie, Oklahoma)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 2	Apr. 11	Apr. 22
2 years in 10 later than--	Mar. 27	Apr. 6	Apr. 17
5 years in 10 later than--	Mar. 16	Mar. 27	Apr. 8
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 29	Oct. 22	Oct. 12
2 years in 10 earlier than--	Nov. 4	Oct. 28	Oct. 18
5 years in 10 earlier than--	Nov. 16	Nov. 9	Oct. 28

## Growing Season

(Data recorded in the period 1951-1990 at Guthrie, Oklahoma)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	216	202	179
8 years in 10	226	210	187
5 years in 10	244	227	202
2 years in 10	262	243	218
1 year in 10	272	251	226

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their specified uses. Soil scientists observed the suitability, limitations, and management for specified uses. They observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil

scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.



# General Soil Map Units

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The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and/or miscellaneous areas and some minor soils and/or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map is part of the State Soil Geographic Data Base (STATSGO). It is at a scale of 1 to 250,000. It should not be used to locate soils for intensive land uses, such as determining suitability for house lots. It is useful for understanding the soil resource and for planning broad land uses in a state or region. The component composition of a STATSGO map unit does not statistically represent a subset (county) or any one portion of the whole STATSGO map unit. A STATSGO map unit may have up to 3 named components, but any one particular area within the STATSGO map unit may not consist of all named components or the components of the entire STATSGO map unit.

The general soil map in this survey reflects the STATSGO composition of the county subset. The subset name of a general soil map unit may vary from county to county, but it is within the parameters of the entire STATSGO map unit. In the legend for the general soil map, the STATSGO map unit name is listed first and the county general soil map unit name is listed directly below. In the text, the STATSGO map unit name is listed first and the county general soil map unit name is listed directly after it.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## 1. OK079—Gracemore-Gaddy-Goodnight (Yahola-Gaddy)

*Very deep, nearly level, well drained and somewhat excessively drained, loamy and sandy soils that formed in recent alluvial sediment on flood plains*

### **Setting**

*Location in the survey area:* Low flood plains of the Cimarron River

*Primary landscape:* Valleys

*Slope range:* 0 to 1 percent

### ***Composition***

*Extent of map unit in the survey area:* 4 percent

*Extent of the components in the map unit:*

Yahola soils—38 percent

Gaddy soils—37 percent

Minor soils (including Lebron and Gracemore)—25 percent

### ***Soil Characteristics***

#### **Yahola**

*Surface layer:* Yellowish red sandy loam

*Underlying material:* Red fine sandy loam and stratified fine sandy loam

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Low flood plains

*Slope range:* 0 to 1 percent

*Parent material:* Loamy alluvium

#### **Gaddy**

*Surface layer:* Brown loamy fine sand

*Underlying material:* Stratified reddish brown loam and stratified pink and pinkish white fine sand

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Seasonal high water table:* None

*Major landform:* Low flood plains

*Slope range:* 0 to 1 percent

*Parent material:* Loamy and sandy alluvium

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Yahola—well suited; Gaddy—poorly suited

*Management concerns:* Flooding, tilth, soil fertility, and maintenance of organic matter content

#### **Rangeland**

*Suitability:* Suited

*Management concerns:* Weed control, tilth, soil fertility, and rotational grazing

#### **Pasture and hayland**

*Suitability:* Yahola—well suited; Gaddy—suited

*Management concerns:* Tilth, soil fertility, and flooding

#### **Urban development**

*Suitability:* Poorly suited

*Management concerns:* Flooding, seepage, and soil stability



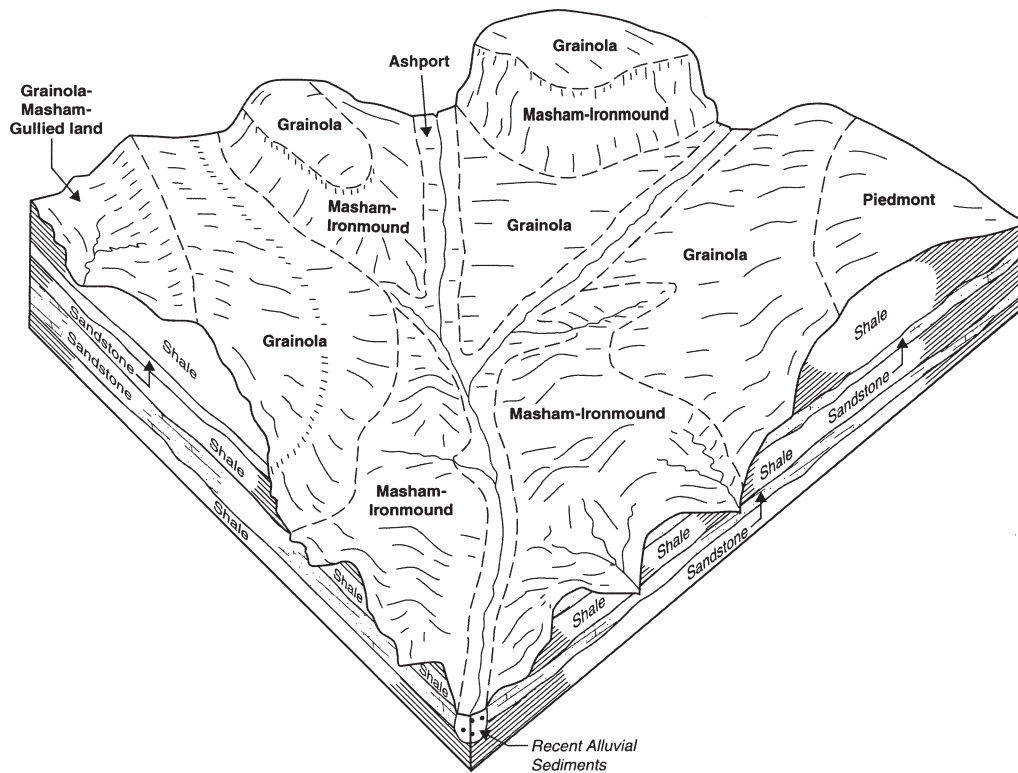


Figure 2.—Typical pattern of soils and underlying material in the Grainola-Masham-Ironmound general soil map unit.

## 2. OK086—Grainola-Lucien-Renfrow (Grainola-Masham-Ironmound)

*Moderately deep and shallow, well drained, gently sloping to steep soils that formed in material weathered from shale or sandstone on prairie uplands (fig. 2)*

### **Setting**

*Location in the survey area:* Northwestern and eastern parts of the county

*Primary landscape:* Uplands

*Slope range:* 3 to 40 percent

### **Composition**

*Extent of map unit in the survey area:* 5 percent

*Extent of the components in the map unit:*

Grainola soils—38 percent

Masham soils—17 percent

Ironmound soils—13 percent

Minor soils (including Stephenville, Kingfisher, Darsil, Piedmont, Coyle, Mulhall, Pulaski, Ashport, and Lawrie)—32 percent

### **Soil Characteristics**

#### **Grainola**

*Surface layer:* Reddish brown clay loam

*Subsoil:* Red silty clay and red shaley clay  
*Bedrock:* Red shale interbedded with siltstone  
*Depth class:* Moderately deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 3 to 8 percent  
*Parent material:* Shale

### **Masham**

*Surface layer:* Reddish brown silty clay loam  
*Subsoil:* Red silty clay  
*Bedrock:* Red shale with streaks of light gray shale  
*Depth class:* Shallow  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 5 to 40 percent  
*Parent material:* Shale

### **Ironmound**

*Surface layer:* Reddish brown fine sandy loam  
*Subsoil:* Red loam  
*Bedrock:* Red sandstone  
*Depth class:* Shallow  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 5 to 40 percent  
*Parent material:* Sandstone

## ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

### **Cropland**

*Suitability:* Grainola—suited; Masham and Ironmound—poorly suited  
*Management concerns:* Soil fertility, erosion hazard, available water-holding capacity, and organic matter content

### **Rangeland**

*Suitability:* Suited  
*Management concerns:* Proper stocking rates, maintenance of soil fertility, and weed and brush control

### **Pasture and hayland**

*Suitability:* Grainola—suited; Masham and Ironmound—poorly suited  
*Management concerns:* Depth to bedrock, low available water capacity, and slope

### **Urban development**

*Suitability:* Poorly suited  
*Management concerns:* High shrink-swell potential, depth to bedrock, slow percolation, and slope

### **3. OK094—Kirkland-Renfrow-Zaneis (Kirkland-Renfrow)**

*Very deep, well drained, nearly level to gently sloping, loamy soils that formed in weathered shale on prairie uplands*

#### ***Setting***

*Location in the survey area:* Areas in the western half of the county

*Primary landscape:* Uplands

*Slope range:* 1 to 5 percent

#### ***Composition***

*Extent of map unit in the survey area:* 4 percent

*Extent of the components in the map unit:*

Kirkland soils—37 percent

Renfrow soils—36 percent

Minor soils (including Ashport, Coyle, Grainola, Lawrie, Renthin, and Zaneis)—27 percent

#### ***Soil Characteristics***

##### **Kirkland**

*Surface layer:* Grayish brown silt loam

*Subsoil:* Very dark grayish brown, dark grayish brown, brown, and reddish brown silty clay

*Bedrock:* Red weakly cemented sandy siltstone

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland terraces

*Slope range:* 0 to 3 percent

*Parent material:* Clayey mantle over shale

##### **Renfrow**

*Surface layer:* Dark reddish brown silt loam

*Subsoil:* Dark reddish gray, reddish brown, and red silty clay

*Bedrock:* Red shale

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 1 to 5 percent

*Parent material:* Shale

#### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, hayland, and urban land

##### **Cropland**

*Suitability:* Well suited

*Management concerns:* Clayey subsoil, erosion hazard, and very slow permeability

##### **Rangeland**

*Suitability:* Suited

*Management concerns:* Clayey subsoil, weed control, and rotational grazing

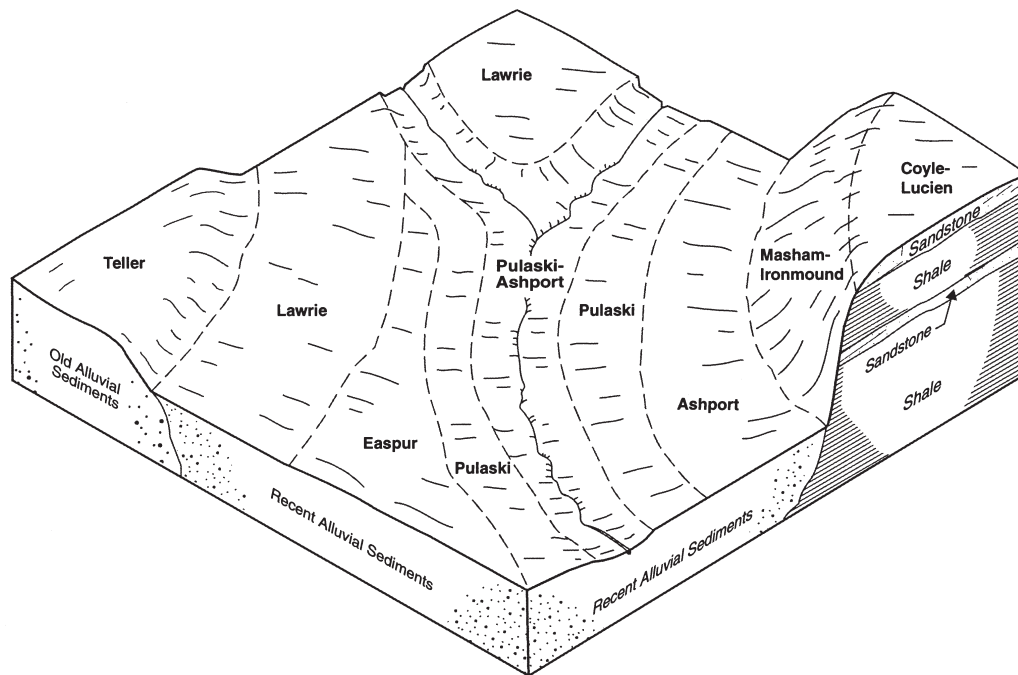


Figure 3.—Typical pattern of soils and underlying material in the Ashport-Pulaski-Lawrie general soil map unit.

#### Pasture and hayland

*Suitability:* Suited

*Management concerns:* Clayey subsoil, weed control, rotational grazing, and soil tilth

#### Urban development

*Suitability:* Poorly suited

*Management concerns:* High shrink-swell potential, slow percolation, high corrosivity to steel, erosion hazard, and clayey subsoil

### 4. OK112—Port-Pulaski-Ashport (Ashport-Pulaski-Lawrie)

*Very deep, well drained, nearly level, loamy soils that formed in alluvium on flood plains (fig. 3)*

#### Setting

*Location in the survey area:* Low or high flood plains of minor streams throughout the county

*Primary landscape:* Valleys

*Slope range:* 0 to 1 percent

#### Composition

*Extent of map unit in the survey area:* 15 percent

*Extent of the components in the map unit:*

Ashport soils—37 percent

Pulaski soils—16 percent  
Lawrie soils—14 percent  
Minor soils (including Easpur, Miller, and Yahola)—33 percent

### ***Soil Characteristics***

#### **Ashport**

*Surface layer:* Reddish brown silt loam  
*Subsoil:* Reddish brown and yellowish red silt loam  
*Underlying material:* Reddish brown silt loam  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Low flood plains  
*Slope range:* 0 to 1 percent  
*Parent material:* Loamy alluvium

#### **Pulaski**

*Surface layer:* Reddish brown and brown fine sandy loam  
*Underlying material:* Red fine sandy loam  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Low flood plains  
*Slope range:* 0 to 1 percent  
*Parent material:* Sandy alluvium

#### **Lawrie**

*Surface layer:* Dark grayish brown and very dark grayish brown silt loam  
*Subsoil:* Brown and reddish brown silty clay loam and clay loam  
*Underlying material:* Reddish brown loam  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* High and low flood plains  
*Slope range:* 0 to 1 percent  
*Parent material:* Loamy alluvium

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Ashport and Lawrie—well suited; Pulaski—suited  
*Management concerns:* Flooding, tilth, permeability, and fertility

#### **Rangeland**

*Suitability:* Suited  
*Management concerns:* Flooding, tilth, and controlled grazing

#### **Pasture and hayland**

*Suitability:* Ashport and Lawrie—well suited; Pulaski—suited  
*Management concerns:* Flooding, soil fertility, erosion hazard, and tilth

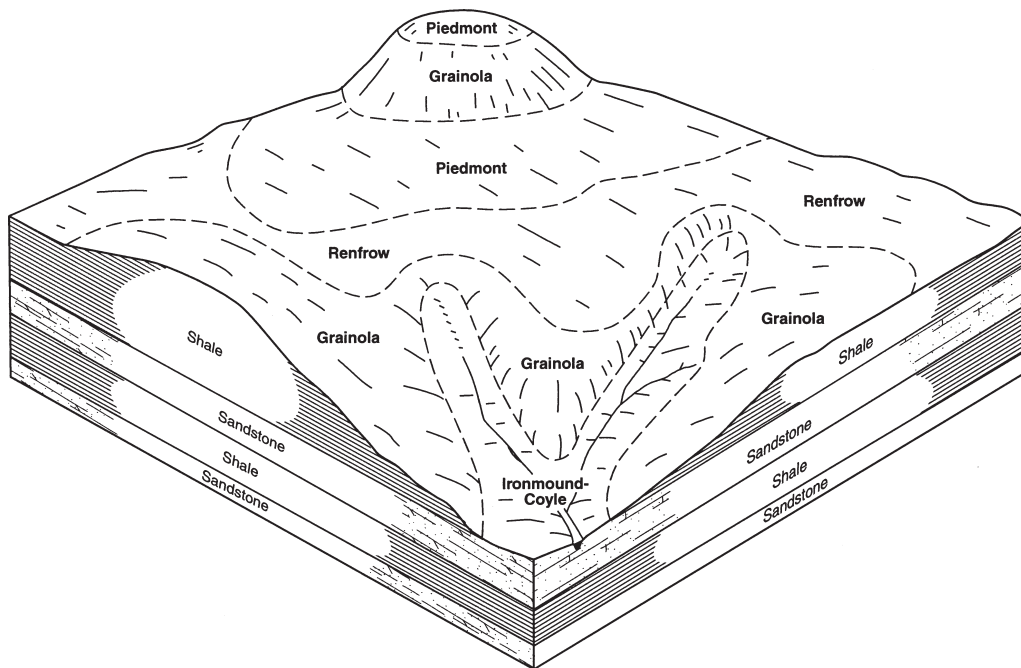


Figure 4.—Typical pattern of soils and underlying material in the Grainola-Renfrow-Piedmont general soil map unit.

#### Urban development

*Suitability:* Poorly suited

*Management concerns:* Flooding, low soil strength, shrink-swell potential, slow percolation, and seepage

### 5. OK116—Renfrow-Kirkland-Grainola (Grainola-Renfrow-Piedmont)

*Very deep and moderately deep, well drained, very gently sloping to moderately sloping, loamy and clayey soils that formed in shale on prairie uplands (fig. 4)*

#### Setting

*Location in the survey area:* Areas throughout the county

*Primary landscape:* Uplands

*Slope range:* 1 to 8 percent

#### Composition

*Extent of map unit in the survey area:* 9 percent

*Extent of the components in the map unit:*

Grainola soils—28 percent

Renfrow soils—25 percent

Piedmont soils—14 percent

Minor soils (including Ashport, Ironmound, Coyle, Kirkland, Lawrie, Masham, Renthin, and Zaneis)—33 percent

## ***Soil Characteristics***

### **Grainola**

*Surface layer:* Reddish brown clay loam  
*Subsoil:* Red silty clay and red shaley clay  
*Bedrock:* Red shale interbedded with siltstone  
*Depth class:* Moderately deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 3 to 8 percent  
*Parent material:* Shale

### **Renfrow**

*Surface layer:* Dark reddish gray silt loam  
*Subsoil:* Dark reddish gray, reddish brown, and red silty clay loam  
*Bedrock:* Red shale  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 1 to 5 percent  
*Parent material:* Shale

### **Piedmont**

*Surface layer:* Reddish brown silty clay  
*Subsoil:* Reddish brown silty clay and red silty clay loam  
*Bedrock:* Red shale interbedded with siltstone  
*Depth class:* Moderately deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland hills  
*Slope range:* 1 to 5 percent  
*Parent material:* Shale

## ***Use and Management***

**Major Uses:** Cropland, hayland, improved pasture, native pasture, rangeland, and urban development

### **Cropland**

*Suitability:* Grainola—poorly suited; Renfrow—well suited; Piedmont—suited  
*Management concerns:* Very slow permeability, maintenance of organic matter content, erosion hazard, and clayey subsoil

### **Rangeland**

*Suitability:* Suited  
*Management concerns:* Weed control, rotational grazing, timely deferment of grazing, and clayey subsoil

### **Pasture and hayland**

*Suitability:* Grainola—poorly suited; Renfrow and Piedmont—suited  
*Management concerns:* Weed control, clayey subsoil, soil fertility, and rotational grazing

**Urban development**

*Suitability:* Poorly suited

*Management concerns:* High shrink-swell potential, slow percolation, depth to bedrock, high corrosivity, and erosion hazard

**6. OK121—Teller-Konawa-Norge (Teller-Navina-Konawa)**

*Very deep, well drained, nearly level to moderately sloping, loamy and sandy soils that formed in loamy material on terraces*

***Setting***

*Location in the survey area:* Areas along major rivers and in the west-central part of the county

*Primary landscape:* Upland terraces

*Slope range:* 0 to 8 percent

***Composition***

*Extent of map unit in the survey area:* 4 percent

*Extent of the components in the map unit:*

Teller soils—34 percent

Navina soils—19 percent

Konawa soils—15 percent

Minor soils (including Ashport, Easpur, Grainola, Lawrie, Minco, and Norge)—32 percent

***Soil Characteristics*****Teller**

*Surface layer:* Reddish brown fine sandy loam

*Subsoil:* Reddish brown and red sandy clay loam and fine sandy loam

*Substratum:* Red fine sandy loam

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Stream terraces

*Slope range:* 1 to 5 percent

*Parent material:* Loamy sediments

**Navina**

*Surface layer:* Brown fine sandy loam

*Subsoil:* Brown fine sandy loam and sandy clay loam and pale brown to yellow fine sandy loam

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland terraces

*Slope range:* 0 to 3 percent

*Parent material:* Loamy alluvium

**Konawa**

*Surface layer:* Brown loamy fine sand

*Subsoil:* Reddish brown and yellowish red sandy clay loam

*Underlying material:* Reddish yellow loamy fine sand



*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland terraces  
*Slope range:* 0 to 8 percent  
*Parent material:* Loamy alluvium

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Teller and Navina—well suited; Konawa—suited  
*Management concerns:* Erosion hazard and slope

#### **Rangeland**

*Suitability:* Teller and Konawa—suited; Navina—not suited  
*Management concerns:* Weed control, rotational grazing, and erosion hazard

#### **Pasture and hayland**

*Suitability:* Teller and Navina—well suited; Konawa—suited  
*Management concerns:* Weed control, soil fertility, and erosion hazard

#### **Urban development**

*Suitability:* Well suited  
*Management concerns:* Seepage, slope, and shrink-swell potential

## **7. OK141—Dougherty-Eufaula (Dougherty-Konawa-Derby)**

*Very deep, well drained and somewhat excessively drained, nearly level to moderately steep, loamy and sandy soils that formed in sandy eolian sediments and sandy and loamy alluvium on terraces (fig. 5)*

### ***Setting***

*Location in the survey area:* The central part of the county along the Cimarron River  
*Primary landscape:* Upland terraces and valley terraces  
*Slope range:* 0 to 15 percent

### ***Composition***

*Extent of map unit in the survey area:* 8 percent  
*Extent of the components in the map unit:*  
     Dougherty soils—29 percent  
     Konawa soils—19 percent  
     Derby soils—19 percent  
     Minor soils (including Bocox, Goodnight, Grainola, Pulaski, Slaughterville, Teller, and Tribbey)—33 percent

### ***Soil Characteristics***

#### **Dougherty**

*Surface layer:* Dark brown and brown loamy fine sand  
*Subsoil:* Yellowish red sandy clay loam and fine sandy loam  
*Underlying material:* Red very fine sandy loam

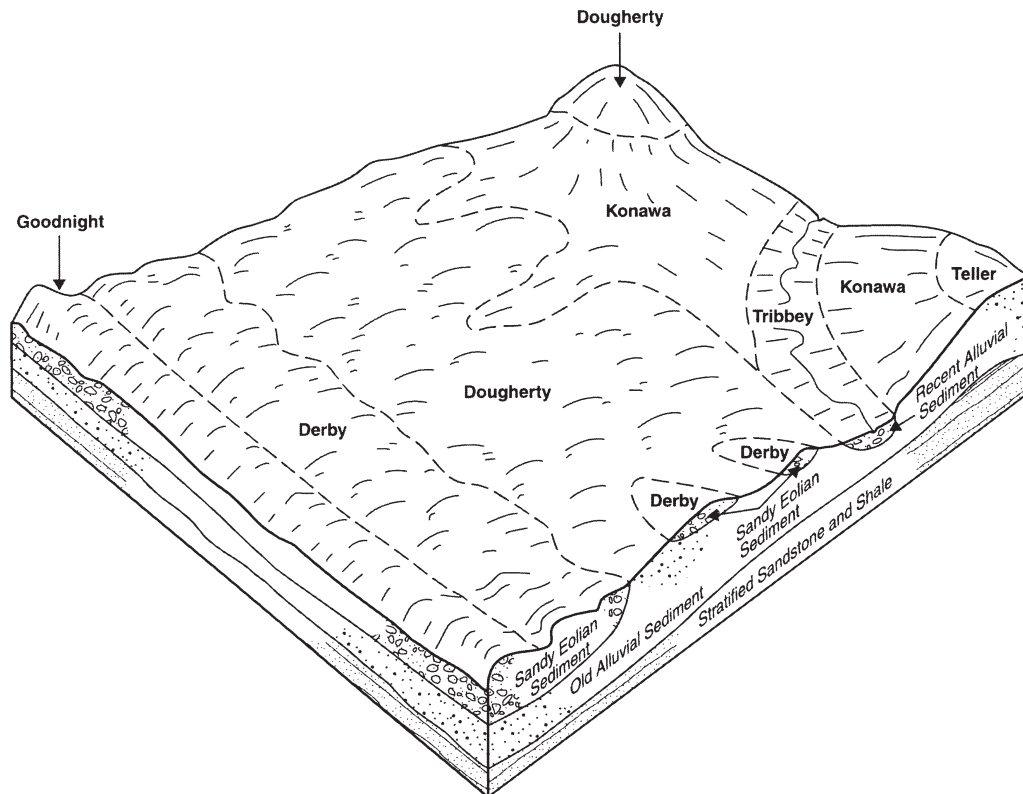


Figure 5.—Typical pattern of soils and underlying material in the Dougherty-Konawa-Derby general soil map unit.

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Dunes  
*Slope range:* 0 to 8 percent  
*Parent material:* Sandy eolian sediments

#### **Konawa**

*Surface layer:* Brown loamy fine sand  
*Subsoil:* Reddish brown, yellowish red, and reddish yellow sandy clay loam and fine sandy loam  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Seasonal high water table:* None  
*Major landform:* Upland terraces  
*Slope range:* 0 to 8 percent  
*Parent material:* Sandy and loamy alluvium

#### **Derby**

*Surface layer:* Dark yellowish brown loamy fine sand  
*Subsurface layer:* Brown and strong brown fine sand  
*Subsoil:* Reddish yellow fine sand and reddish yellow and reddish brown loamy fine sand  
*Depth class:* Very deep  
*Drainage class:* Somewhat excessively drained

*Seasonal high water table:* None

*Major landform:* Dunes

*Slope range:* 0 to 15 percent

*Parent material:* Sandy eolian sediments

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Dougherty and Konawa—suited; Derby—poorly suited

*Management concerns:* Erosion hazard, low content of organic matter, soil fertility, runoff, and low available water capacity

#### **Rangeland**

*Suitability:* Suited

*Management concerns:* Weed control, brush control, rotational grazing, and erosion hazard

#### **Pasture and hayland**

*Suitability:* Dougherty and Konawa—suited; Derby—poorly suited

*Management concerns:* Erosion hazard, low content of organic matter, soil fertility, and low available water capacity

#### **Urban development**

*Suitability:* Dougherty and Derby—suited; Konawa—well suited

*Management concerns:* Slope, seepage, droughtiness, and slow percolation

## **8. OK151—Stephenville-Darnell-Newella (Stephenville-Darsil-Harrah)**

*Very deep to shallow, well drained and excessively drained, very gently sloping to steep, loamy and sandy soils that formed in material weathered from sandstone on forested uplands (fig. 6)*

### ***Setting***

*Location in the survey area:* Areas in the eastern half of the county

*Primary landscape:* Uplands

*Slope range:* 1 to 45 percent

### ***Composition***

*Extent of map unit in the survey area:* 22 percent

*Extent of the components in the map unit:*

Stephenville soils—27 percent

Darsil soils—22 percent

Harrah soils—14 percent

Minor soils (including Easpur, Grainola, Littleaxe, Masham, Newalla, Pulaski, Tribbey, and Zaneis)—37 percent

### ***Soil Characteristics***

#### **Stephenville**

*Surface layer:* Brown fine sandy loam

*Subsurface layer:* Brown fine sandy loam

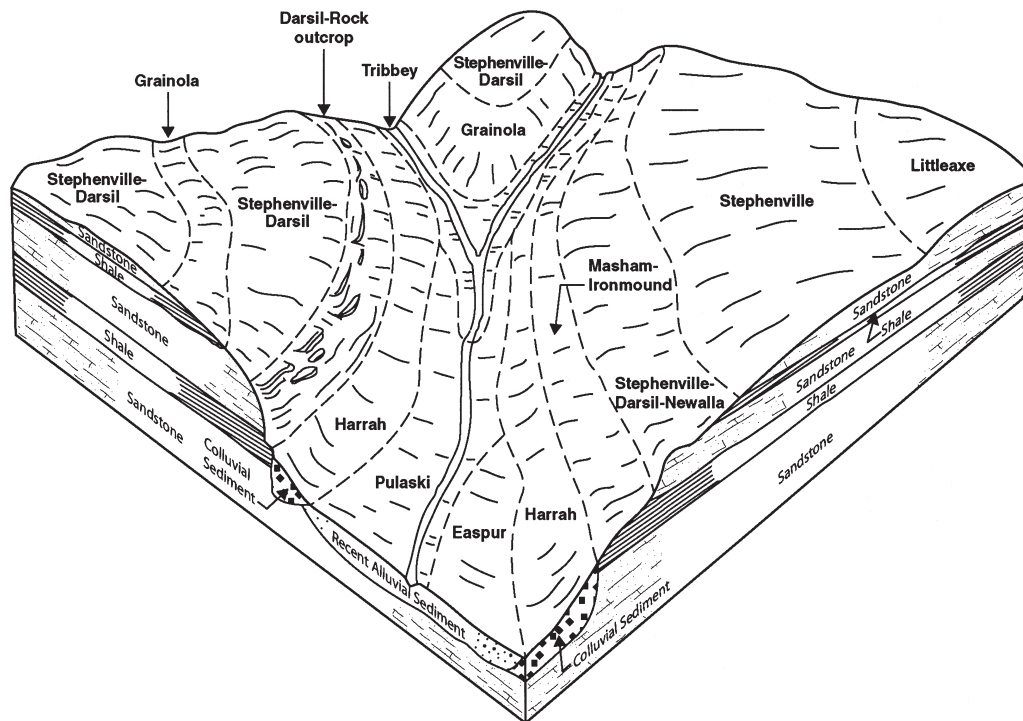


Figure 6.—Typical pattern of soils and underlying material in the Stephenville-Darsil-Harrah general soil map unit.

*Subsoil:* Yellowish red sandy clay loam and fine sandy loam

*Bedrock:* Brown sandstone

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 1 to 15 percent

*Parent material:* Sandstone

### **Darsil**

*Surface layer:* Brown loamy fine sand

*Subsoil:* Red fine sandy loam

*Bedrock:* Red sandstone

*Depth class:* Shallow

*Drainage class:* Excessively drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 1 to 45 percent

*Parent material:* Weakly cemented sandstone

### **Harrah**

*Surface layer:* Brown fine sandy loam

*Subsurface layer:* Reddish brown fine sandy loam

*Subsoil:* Red sandy clay loam and fine sandy loam

*Depth class:* Very deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 3 to 45 percent

*Parent material:* Sandy and loamy colluvial material weathered from sandstone

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Stephenville and Harrah—suited; Darsil—poorly suited

*Management concerns:* Low content of organic matter, low available water capacity, soil fertility, erosion hazard, and slope

#### **Rangeland**

*Suitability:* Suited

*Management concerns:* Soil fertility, low available water capacity, low content of organic matter, rotational grazing, and proper stocking rates

#### **Pasture and hayland**

*Suitability:* Stephenville—suited; Darsil—poorly suited; Harrah—well suited

*Management concerns:* Soil fertility, low available water capacity, and low content of organic matter

#### **Urban development**

*Suitability:* Stephenville—suited; Darsil—poorly suited; Harrah—well suited

*Management concerns:* Depth to bedrock and slope

## **9. OK225—Coyle-Ironmound-Zaneis (Coyle-Ironmound-Zaneis)**

*Deep to shallow, well drained, very gently sloping to steep, loamy soils that formed in weathered sandstone on prairie uplands (fig. 7)*

### ***Setting***

*Location in the survey area:* Areas in the central part of the county

*Primary landscape:* Uplands

*Slope range:* 1 to 30 percent

### ***Composition***

*Extent of map unit in the survey area:* 29 percent

*Extent of the components in the map unit:*

Coyle soils—27 percent

Ironmound soils—20 percent

Zaneis soils—15 percent

Minor soils (including Ashport, Darsil, Easpor, Grainola, Harrah, Mulhall, Pulaski, Renthin, and Teller)—38 percent

### ***Soil Characteristics***

#### **Coyle**

*Surface layer:* Brown loam

*Subsoil:* Dark reddish brown, yellowish red, and reddish brown sandy clay loam and gravelly fine sandy loam

*Underlying material:* Yellowish red partially weathered sandstone

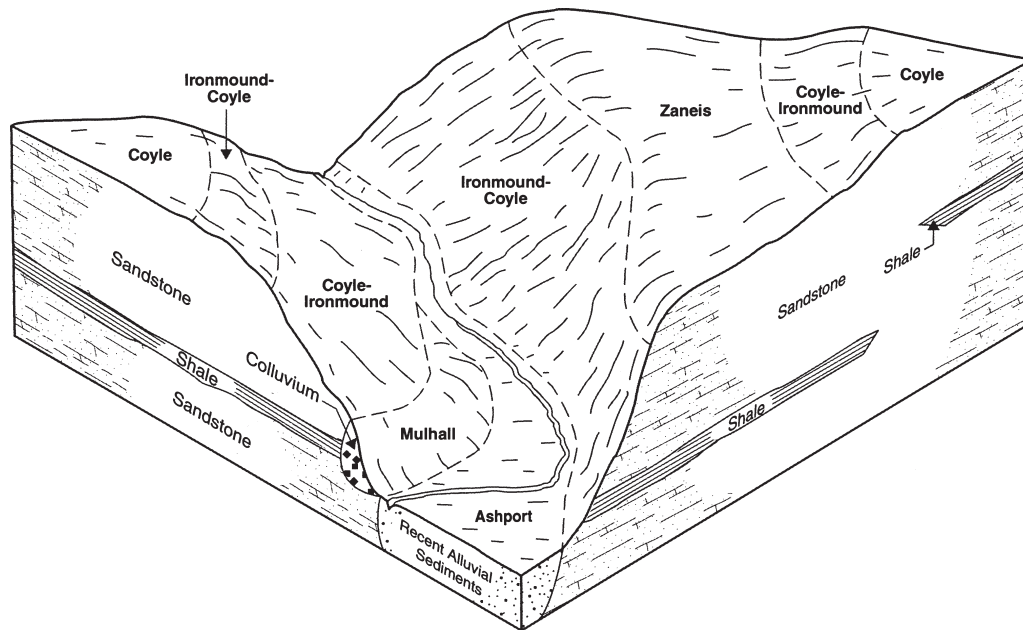


Figure 7.—Typical pattern of soils and underlying material in the Coyle-Ironmound-Zaneis general soil map unit.

*Bedrock:* Yellowish red hard sandstone

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 1 to 12 percent

*Parent material:* Sandstone

#### **Ironmound**

*Surface layer:* Reddish brown fine sandy loam

*Subsoil:* Red loam

*Bedrock:* Red sandstone

*Depth class:* Shallow

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 3 to 30 percent

*Parent material:* Sandstone

#### **Zaneis**

*Surface layer:* Grayish brown loam

*Subsoil:* Brown, reddish brown, and yellowish red loam and sandy clay loam

*Bedrock:* Red partially weathered sandstone

*Depth class:* Deep

*Drainage class:* Well drained

*Seasonal high water table:* None

*Major landform:* Upland hills

*Slope range:* 1 to 5 percent

*Parent material:* Sandstone

### ***Use and Management***

**Major Uses:** Cropland, pastureland, rangeland, and urban land

#### **Cropland**

*Suitability:* Coyle and Zaneis—well suited; Ironmound—poorly suited

*Management concerns:* Soil fertility, erosion hazard, tilth, organic matter content, and slope

#### **Rangeland**

*Suitability:* Suited

*Management concerns:* Erosion hazard, weed control, rotational grazing, proper stocking, and soil fertility

#### **Pasture and hayland**

*Suitability:* Coyle—suited; Ironmound—poorly suited; Zaneis—well suited

*Management concerns:* Erosion hazard, soil fertility, tilth, and low content of organic matter

#### **Urban development**

*Suitability:* Coyle and Zaneis—suited; Ironmound—poorly suited

*Management concerns:* Shrink-swell potential, erosion hazard, depth to bedrock, slow percolation, and slope





## Detailed Soil Map Units

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The map units on the detailed soil maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given in the section “Use and Management of the Soils.”

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, are mapped without including areas of minor components of other taxonomic classes. Consequently, map units are made up of the soils or miscellaneous areas for which they are named and some areas of included soils that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting or similar inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Ashport silt loam, 0 to 1 percent slopes, occasionally flooded, is a phase of the Ashport series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Darsil-Rock outcrop complex, 15 to 45 percent slopes, is an example.

An *undifferentiated group* consists of two or more soils or miscellaneous areas that are not consistently associated geographically and, therefore, do not always occur together in the same named map unit delineation. These components are included in the same named map unit because their use and management are the same or very similar for common uses. Generally, they are grouped together because some common feature determines their use and management. Each delineation has at least one of the major components, and some may have all of them. Coyle and Zaneis soils, 3 to 5 percent slopes, severely eroded, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example.

The table "Acreage and Proportionate Extent of the Soils" gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded-----	7,753	1.6
AstA	Ashport silt loam, 0 to 1 percent slopes, frequently flooded-----	17,881	3.7
BetA	Bethany silt loam, 0 to 1 percent slopes-----	248	*
BetB	Bethany silt loam, 1 to 3 percent slopes-----	135	*
BocA	Bocox loamy fine sand, 0 to 1 percent slopes-----	934	0.2
Bt1A	Bathel loamy sand, 0 to 1 percent slopes-----	669	0.1
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded-----	1,019	0.2
CAID	Coyle-Ashport-Ironmound complex, 1 to 8 percent slopes-----	6,258	1.3
CoIC2	Coyle-Ironmound complex, 3 to 5 percent slopes, eroded-----	28,063	5.9
CoUB	Coyle-Urban land complex, 1 to 3 percent slopes-----	---	*
CoUC	Coyle-Urban land complex, 1 to 5 percent slopes-----	1,592	0.3
CoyB	Coyle loam, 1 to 3 percent slopes-----	2,683	0.6
CoyC2	Coyle loam, 3 to 5 percent slopes, eroded-----	9,312	1.9
CoZC3	Coyle and Zaneis soils, 3 to 5 percent slopes, severely eroded-----	4,183	0.9
DAM	Dam-----	176	*
DerB	Derby loamy fine sand, 0 to 3 percent slopes-----	1,951	0.4
DerD	Derby loamy fine sand, 3 to 8 percent slopes-----	3,101	0.6
DerE	Derby loamy fine sand, 8 to 15 percent slopes-----	2,136	0.4
DiRG	Darsil-Rock outcrop complex, 15 to 45 percent slopes-----	14,702	3.1
DouB	Dougherty loamy fine sand, 0 to 3 percent slopes-----	5,160	1.1
DouD	Dougherty loamy fine sand, 3 to 8 percent slopes-----	4,833	1.0
DUM	Dumps-----	50	*
EasA	Easpor loam, 0 to 1 percent slopes, occasionally flooded-----	4,965	1.0
GadA	Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded-----	1,219	0.3
GaGA	Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded-----	1,820	0.4
GMGE4	Grainola-Masham-Gullied land complex, 5 to 15 percent slopes-----	1,984	0.4
GMLG	Grainola-Masham-Lucien complex, 5 to 40 percent slopes, very bouldery----	45	*
GohC	Goodnight loamy fine sand, 1 to 5 percent slopes-----	508	0.1
GohE	Goodnight loamy fine sand, 5 to 15 percent slopes-----	1,107	0.2
GooE	Goodnight fine sand, 1 to 15 percent slopes-----	819	0.2
GooG	Goodnight fine sand, 15 to 45 percent slopes-----	837	0.2
GrAC	Grainola silty clay loam, 3 to 5 percent slopes-----	11,023	2.3
GrAD2	Grainola silty clay loam, 5 to 8 percent slopes, eroded-----	17,138	3.6
GrHC	Grant-Huska complex, 1 to 5 percent slopes-----	28	*
GrIE	Grainola-Ironmound complex, 3 to 12 percent slopes-----	---	*
GrLE	Grainola-Lucien complex, 5 to 12 percent slopes-----	266	*
HaGD4	Harrah-Gullied land complex, 5 to 8 percent slopes-----	562	0.1
HarC	Harrah fine sandy loam, 3 to 5 percent slopes-----	4,480	0.9
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded-----	6,029	1.3
HarG	Harrah fine sandy loam, 3 to 45 percent slopes-----	6,196	1.3
HawB	Hawley loamy fine sand, 0 to 3 percent slopes, rarely flooded-----	698	0.1
ICGD3	Ironmound-Coyle-Grainola complex, 5 to 8 percent slopes, severely eroded-----	3,454	0.7
IrCE	Ironmound-Coyle complex, 5 to 15 percent slopes-----	19,289	4.0
IroC2	Ironmound loam, 3 to 5 percent slopes, eroded-----	878	0.2
KgFB	Kingfisher silt loam, 1 to 3 percent slopes-----	823	0.2
KinC2	Kingfisher loam, 3 to 5 percent slopes, eroded-----	4,276	0.9
KonB	Konawa loamy fine sand, 0 to 3 percent slopes-----	4,108	0.9
KonD2	Konawa loamy fine sand, 3 to 8 percent slopes, eroded-----	3,991	0.8
KrdA	Kirkland silt loam, 0 to 1 percent slopes-----	4,084	0.9
KrkB	Kirkland silty clay loam, 1 to 3 percent slopes-----	9,866	2.1
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded-----	7,132	1.5
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded-----	1,698	0.4
LerA	Lebron clay, 0 to 1 percent slopes, occasionally flooded-----	1,062	0.2
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes-----	1,031	0.2
LitC2	Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded-----	1,439	0.3
M-W	Miscellaneous water-----	28	*
MaID	Masham-Ironmound complex, 5 to 15 percent slopes-----	14,379	3.0
MaIG	Masham-Ironmound complex, 15 to 40 percent slopes-----	1,514	0.3
MinB	Minco very fine sandy loam, 1 to 3 percent slopes-----	547	0.1

See footnote at end of table.

## Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
MinC	Minco very fine sandy loam, 3 to 5 percent slopes-----	823	0.2
MinD	Minco very fine sandy loam, 5 to 8 percent slopes-----	84	*
MinF	Minco very fine sandy loam, 8 to 20 percent slopes-----	528	0.1
MilA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded-----	1,778	0.4
MulC	Mulhall loam, 3 to 5 percent slopes-----	3,271	0.7
MulC2	Mulhall loam, 3 to 5 percent slopes, eroded-----	817	0.2
NavA	Navina fine sandy loam, 0 to 1 percent slopes-----	1,687	0.4
NavB	Navina fine sandy loam, 1 to 3 percent slopes-----	1,849	0.4
NeGD4	Newalla-Gullied land complex, 3 to 8 percent slopes-----	196	*
NewB	Newalla fine sandy loam, 1 to 3 percent slopes-----	2,387	0.5
NorA	Norge silt loam, 0 to 1 percent slopes-----	585	0.1
NorB	Norge silt loam, 1 to 3 percent slopes-----	3,704	0.8
NorC2	Norge silt loam, 3 to 5 percent slopes, eroded-----	8,375	1.7
OWHD	Oil waste land-Huska complex, 1 to 8 percent slopes-----	125	*
PieB	Piedmont silty clay loam, 1 to 3 percent slopes-----	3,275	0.7
PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded-----	9,231	1.9
PIT	Pits-----	148	*
PukA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded-----	9,269	1.9
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded-----	2,729	0.6
RenB	Renfrow silt loam, 1 to 3 percent slopes-----	8,222	1.7
RenC	Renfrow silt loam, 3 to 5 percent slopes-----	554	0.1
RewC2	Renfrow silty clay loam, 3 to 5 percent slopes, eroded-----	13,908	2.9
RinB	Renthin silt loam, 1 to 3 percent slopes-----	2,344	0.5
RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded-----	4,986	1.0
SDGD4	Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes-----	7,459	1.6
SDND	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes-----	11,157	2.3
SDND2	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded-----	17,807	3.7
SlaB	Slaughterville fine sandy loam, 1 to 3 percent slopes-----	702	0.1
SlaD	Slaughterville fine sandy loam, 3 to 8 percent slopes-----	748	0.2
SlaF	Slaughterville fine sandy loam, 8 to 20 percent slopes-----	128	*
StDC	Stephenville-Darsil complex, 1 to 5 percent slopes-----	11,149	2.3
StDC2	Stephenville-Darsil complex, 1 to 5 percent slopes, eroded-----	9,599	2.0
StDE	Stephenville-Darsil complex, 5 to 15 percent slopes-----	20,097	4.2
SteB	Stephenville fine sandy loam, 1 to 3 percent slopes-----	934	0.2
SteC2	Stephenville fine sandy loam, 3 to 5 percent slopes, eroded-----	715	0.1
SUND	Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes-----	293	*
TelB	Teller loam, 1 to 3 percent slopes-----	4,696	1.0
TelC2	Teller loam, 3 to 5 percent slopes, eroded-----	8,141	1.7
TriA	Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded-----	4,538	0.9
URB	Urban land-----	3,417	0.7
W	Water-----	6,709	1.4
YaaA	Yahola loam, 0 to 1 percent slopes, occasionally flooded-----	1,071	0.2
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded-----	3,983	0.8
ZaHC	Zaneis-Huska complex, 3 to 5 percent slopes-----	5,483	1.1
ZanB	Zaneis loam, 1 to 3 percent slopes-----	8,403	1.8
ZanC	Zaneis loam, 3 to 5 percent slopes-----	700	0.1
ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded-----	18,452	3.8
	Total-----	479,418	100.0

\* Less than 0.1 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.4 percent of the survey area.

## **AspA—Ashport silt loam, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Ashport and similar soils**

*Extent of the component in the map unit:* 95 percent  
*Geomorphic setting:* Flood plain in a valley  
*Parent material:* Fine-silty alluvium  
*Slope range:* 0 to 1 percent  
*Runoff:* Negligible  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 11.8 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* Occasional  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—2w  
Range site number and name—080AY050OK, Loamy Bottomland

#### *Typical profile:*

Ap—0 to 10 inches; silt loam  
Bw1—10 to 22 inches; silt loam  
Bw2—22 to 44 inches; silt loam  
C—44 to 80 inches; silt loam

*Location of representative profile:* About 1,175 feet north and 225 feet east of the southwest corner of sec. 15, T. 18 N., R. 3 W.

### ***Management***

*Major uses:* Cropland (fig. 8), pastureland, hayland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **AstA—Ashport silt loam, 0 to 1 percent slopes, frequently flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches





**Figure 8.—Grain sorghum growing on Ashport silt loam, 0 to 1 percent slopes, occasionally flooded.**

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Ashport and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Fine-silty alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Frequent

*Ponding:* None

*Interpretive groups:*

Land capability classification—5w

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

A—0 to 11 inches; silt loam

Bw—11 to 30 inches; silt loam

Ab—30 to 36 inches; silt loam

Bwb—36 to 52 inches; silt loam

Cb1—52 to 67 inches; silt loam

Cb2—67 to 80 inches; silt loam

*Location of representative profile:* About 2,250 feet east and 350 feet north of the southwest corner of sec. 27, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **BetA—Bethany silt loam, 0 to 1 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 950 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Bethany and similar soils**

*Extent of the component in the map unit:* 93 percent

*Geomorphic setting:* Terrace on an upland

*Position on landform:* Tread

*Parent material:* Silty and clayey alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Slow

*Slowest permeability class within a depth of 60 inches:* Slow

*Drainage class:* Well drained

*Available water capacity:* About 10.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—1

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; silt loam

A—8 to 18 inches; silt loam

BA—18 to 28 inches; silty clay loam

Bt1—28 to 46 inches; silty clay

Bt2—46 to 62 inches; silty clay

Btk—62 to 80 inches; silty clay

*Location of representative profile:* About 1,000 feet north and 150 feet west of the southeast corner of sec. 32, T. 18 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, pastureland, hayland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **BetB—Bethany silt loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 950 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Bethany and similar soils**

*Extent of the component in the map unit:* 93 percent

*Geomorphic setting:* Terrace on an upland

*Position on landform:* Tread

*Parent material:* Silty and clayey alluvium

*Slope range:* 1 to 3 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Slow

*Slowest permeability class within a depth of 60 inches:* Slow

*Drainage class:* Well drained

*Available water capacity:* About 10.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 10 inches; silt loam

BA—10 to 22 inches; silty clay loam

Bt1—22 to 31 inches; silty clay

Bt2—31 to 51 inches; silty clay

Bt3—51 to 74 inches; silty clay

Btk—74 to 80 inches; silty clay loam

*Location of representative profile:* About 2,375 feet west and 1,150 feet south of the northeast corner of sec. 23, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, pastureland, hayland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



**BocA—Bocox loamy fine sand, 0 to 1 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 1,000 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Bocox and similar soils**

*Extent of the component in the map unit:* 94 percent

*Geomorphic setting:* Depression on an interdune in a dunefield on sandhills on uplands

*Parent material:* Sandy eolian deposits

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Very poorly drained

*Available water capacity:* About 6.6 inches

*Seasonal high water table:* At the soil surface

*Flooding:* None

*Ponding:* Frequent

*Interpretive groups:*

Land capability classification—5w

Range site number and name—080AY090OK, Meadow

*Typical profile:*

A—0 to 11 inches; loamy fine sand

E1—11 to 20 inches; loamy fine sand

E2—20 to 33 inches; loamy fine sand

Bt1—33 to 52 inches; sandy clay loam

Bt2—52 to 65 inches; fine sandy loam

Bt3—65 to 80 inches; fine sandy loam

*Location of representative profile:* About 500 feet west and 1,900 feet south of the northeast corner of sec. 7, T. 17 N., R. 4 E.

***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**Bt1A—Bathel loamy sand, 0 to 1 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 1,000 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Bathel and similar soils**

*Extent of the component in the map unit:* 94 percent

*Geomorphic setting:* Interdune in a dunefield on sandhills on a terrace on uplands

*Position on landform:* Tread

*Parent material:* Sandy eolian deposits

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Somewhat poorly drained

*Available water capacity:* About 7.2 inches

*Depth to the top of the seasonal high water table:* 2.0 to 3.5 feet

*Flooding:* None

*Ponding:* Frequent

*Interpretive groups:*

Land capability classification—3w

Range site number and name—080AY099OK, Depressional Upland

*Typical profile:*

Ap—0 to 12 inches; loamy sand

E—12 to 18 inches; fine sandy loam

Bt—18 to 22 inches; sandy clay loam

Btg—22 to 45 inches; sandy clay loam

BCg—45 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,800 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **CaaA—Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Canadian and similar soils**

*Extent of the component in the map unit:* 94 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 8.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Rare

*Ponding:* None

*Interpretive groups:*

Land capability classification—1

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

Ap—0 to 10 inches; fine sandy loam

A—10 to 19 inches; fine sandy loam

Bw1—19 to 31 inches; fine sandy loam

Bw2—31 to 41 inches; fine sandy loam

C1—41 to 55 inches; fine sandy loam

C2—55 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,200 feet west and 2,950 feet south of the northeast corner of sec. 28, T. 18 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, pastureland, hayland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **CAID—Coyle-Ashport-Ironmound complex, 1 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A (fig. 9)

*Elevation range:* 850 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 31 percent

*Geomorphic setting:* Drainageway on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate



**Figure 9.—Landscape of the Coyle-Ashport-Ironmound complex, 1 to 8 percent slopes, showing the typical prairie drainageway of the Central Rolling Red Prairies Major Land Resource Area.**

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A—0 to 10 inches; loam

Bt1—10 to 19 inches; clay loam

Bt2—19 to 36 inches; clay loam

Cr—36 to 40 inches; bedrock

*Location of representative profile:* About 1,600 feet west and 1,050 feet south of the northeast corner of sec. 25, T. 19 N., R. 3 W.

#### **Ashport and similar soils**

*Extent of the component in the map unit:* 28 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Fine-silty alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 11.8 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* Frequent  
*Ponding:* None

*Interpretive groups:*  
Land capability classification—5w  
Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*  
A—0 to 11 inches; silt loam  
Bw1—11 to 26 inches; silt loam  
Bw2—26 to 46 inches; loam  
C1—46 to 63 inches; loam  
C2—63 to 80 inches; stratified loamy fine sand to loam to silty clay

*Location of representative profile:* About 1,600 feet west and 1,050 feet south of the northeast corner of sec. 25, T. 19 N., R. 3 W.

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 22 percent  
*Geomorphic setting:* Drainageway on uplands  
*Position on landform:* Backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 8 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 3.0 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*  
Land capability classification—4e  
Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*  
A—0 to 6 inches; loam  
Bw—6 to 18 inches; loam  
Cr—18 to 24 inches; bedrock

*Location of representative profile:* About 1,500 feet west and 900 feet south of the northeast corner of sec. 25, T. 19 N., R. 3 W.

### **Management**

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”





Figure 10.—Landscape of the Coyle-Ironmound complex, 3 to 5 percent slopes, eroded.

## **ColC2—Coyle-Ironmound complex, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A (fig. 10)

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 61 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 11 inches; loam

Bt1—11 to 26 inches; clay loam

Bt2—26 to 37 inches; clay loam

Cr—37 to 40 inches; bedrock

*Location of representative profile:* About 1,250 feet north and 1,850 feet east of the southwest corner of sec. 23, T. 19 N., R. 4 W.

**Ironmound and similar soils**

*Extent of the component in the map unit:* 33 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY883OK, Reseeded Shallow Prairie

*Typical profile:*

Ap—0 to 5 inches; loam

Bw—5 to 17 inches; loam

Cr—17 to 24 inches; bedrock

*Location of representative profile:* About 1,250 feet north and 1,450 feet east of the southwest corner of sec. 23, T. 19 N., R. 4 W.

**Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**CoUB—Coyle-Urban land complex, 1 to 3 percent slopes****Map Unit Setting**

*Major land resource area:* 80A

*Elevation range:* 700 to 2,000 feet

*Mean annual precipitation:* 22 to 40 inches

*Mean annual air temperature:* 57 to 64 degrees F

*Frost-free period:* 185 to 230 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 55 percent

*Geomorphic setting:* Hillslope on hill on uplands

*Position on landform:* Shoulder and summit

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 3 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 3.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3s

Range site number and name—none assigned

*Typical profile:*

A—0 to 8 inches; loam

BA—8 to 14 inches; loam

Bt—14 to 22 inches; clay loam

Cr—22 to 30 inches; bedrock

*Location of representative profile:* Oklahoma County, Oklahoma; about 600 feet west and 2,180 feet north of the southeast corner of sec. 28, T. 14 N., R. 3 W.

#### **Urban land**

*Extent of the component in the map unit:* 40 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Earthy fill derived from sandstone

*Slope range:* 1 to 3 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Definition:*

Urban land mostly consists of residential and business areas, streets, and parking areas.

*Location of a representative area:* Oklahoma County, Oklahoma; about 625 feet west and 2,100 feet north of the southeast corner of sec. 28, T. 14 N., R. 3 W.

### ***Management***

*Major uses:* Urban land

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."



## **CoUC—Coyle-Urban land complex, 1 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 42 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—none assigned

*Typical profile:*

Ap—0 to 8 inches; loam

A—8 to 12 inches; loam

Bt1—12 to 22 inches; clay loam

Bt2—22 to 29 inches; clay loam

Cr—29 to 40 inches; bedrock

*Location of representative profile:* About 200 feet west and 1,250 feet north of the southeast corner of sec. 3, T. 16 N., R. 2 W.

#### **Urban land**

*Extent of the component in the map unit:* 38 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Mine spoil or earthy fill derived from sandstone

*Slope range:* 1 to 5 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Definition:*

Urban land mostly consists of residential and business areas, paved roads, streets, and parking areas.

*Location of a representative area:* About 200 feet west and 1,275 feet north of the southeast corner of sec. 3, T. 16 N., R. 2 W.

### ***Management***

*Major uses:* Urban land

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **CoyB—Coyle loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 3 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie (fig. 11)

*Typical profile:*

A—0 to 6 inches; loam

BA—6 to 11 inches; loam

Bt1—11 to 18 inches; clay loam

Bt2—18 to 25 inches; clay loam

BC—25 to 31 inches; clay loam

Cr—31 to 42 inches; bedrock

*Location of representative profile:* About 450 feet west and 600 feet north of the southeast corner of sec. 9, T. 18 N., R. 4 W

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



Figure 11.—Native grasses on Coyle loam, 1 to 3 percent slopes.

## **CoyC2—Coyle loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 5 inches; loam

BA—5 to 10 inches; loam

Bt1—10 to 14 inches; sandy clay loam

Bt2—14 to 18 inches; sandy clay loam

BC—18 to 27 inches; fine sandy loam

Cr—27 to 37 inches; bedrock

*Location of representative profile:* About 1,450 feet east and 1,600 feet north of the southwest corner of sec. 34, T. 17 N., R. 2 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **CoZC3—Coyle and Zaneis soils, 3 to 5 percent slopes, severely eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 70 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and summit

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 6 inches; loam

Bt1—6 to 18 inches; clay loam

Bt2—18 to 31 inches; clay loam

Cr—31 to 40 inches; bedrock

*Location of representative profile:* About 1,900 feet east and 1,100 feet south of the northwest corner of sec. 22, T. 19 N., R. 2 W.

### **Zaneis and similar soils**

*Extent of the component in the map unit:* 15 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 7.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 5 inches; loam

Bt1—5 to 15 inches; clay loam

Bt2—15 to 35 inches; clay loam

Bt3—35 to 47 inches; clay loam

Cr—47 to 60 inches; bedrock

*Location of representative profile:* About 1,900 feet east and 1,050 feet south of the northwest corner of sec. 22, T. 19 N., R. 2 W.

### **Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



## **DAM—Dam**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Dam**

*Extent of the component in the map unit:* 100 percent  
*Geomorphic setting:* Hill on uplands  
*Parent material:* Mine spoil or earthy fill  
*Slope range:* 3 to 45 percent  
*Runoff:* Very high

#### *Interpretive groups:*

Land capability classification—8s  
Range site number and name—none assigned

#### *Definition:*

This map unit consists of manmade dams for ponds and lakes.

*Location of a representative area:* About 700 feet east and 100 feet south of the northwest corner of sec. 32, T. 15 N., R. 2 W.

### ***Management***

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **DerB—Derby loamy fine sand, 0 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,100 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Derby and similar soils**

*Extent of the component in the map unit:* 90 percent  
*Geomorphic setting:* Dune in a dunefield on sandhills in a valley  
*Position on landform:* Summit and backslope  
*Parent material:* Sandy eolian deposits  
*Slope range:* 0 to 3 percent  
*Runoff:* Negligible  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Rapid  
*Slowest permeability class within a depth of 60 inches:* Rapid  
*Drainage class:* Somewhat excessively drained

*Available water capacity:* About 5.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3s

Range site number and name—084AY018OK, Deep Sand Savannah

*Typical profile:*

Ap—0 to 11 inches; loamy fine sand

A—11 to 30 inches; loamy fine sand

E—30 to 52 inches; loamy fine sand

E and Bt—52 to 84 inches; stratified fine sand to loamy fine sand to fine sandy loam

*Location of representative profile:* About 900 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, and pastureland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **DerD—Derby loamy fine sand, 3 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Derby and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Position on landform:* Summit and backslope

*Parent material:* Sandy eolian deposits

*Slope range:* 3 to 8 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Somewhat excessively drained

*Available water capacity:* About 4.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY018OK, Deep Sand Savannah

*Typical profile:*

Ap—0 to 9 inches; loamy fine sand

A—9 to 23 inches; loamy fine sand

E—23 to 49 inches; fine sand

E and Bt—49 to 80 inches; stratified fine sand to loamy fine sand

*Location of representative profile:* About 1,600 feet east and 2,350 feet south of the northwest corner of sec. 7, T. 16 N., R. 4 W.

**Management**

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**DerE—Derby loamy fine sand, 8 to 15 percent slopes****Map Unit Setting**

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

**Major Component Description****Derby and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Position on landform:* Summit and backslope

*Parent material:* Sandy eolian deposits

*Slope range:* 8 to 15 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Somewhat excessively drained

*Available water capacity:* About 4.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY018OK, Deep Sand Savannah

*Typical profile:*

Ap—0 to 11 inches; loamy fine sand

A—11 to 20 inches; loamy fine sand

E1—20 to 38 inches; fine sand

E2—38 to 54 inches; fine sand

E and Bt—54 to 80 inches; loamy fine sand

*Location of representative profile:* About 1,500 feet west and 1,100 feet north of the southeast corner of sec. 6, T. 16 N., R. 4 W.



### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **DiRG—Darsil-Rock outcrop complex, 15 to 45 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Darsil and similar soils**

*Extent of the component in the map unit:* 67 percent

*Geomorphic setting:* Drainageway on uplands

*Position on landform:* Backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 15 to 45 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Excessively drained

*Available water capacity:* About 1.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—7e

Range site number and name—084AY089OK, Shallow Savannah

*Typical profile:*

A—0 to 4 inches; loamy fine sand

EC—4 to 16 inches; loamy fine sand

Cr—16 to 24 inches; bedrock

*Location of representative profile:* About 1,450 feet east and 1,200 feet south of the northwest corner of sec. 36, T. 15 N., R. 1 W.

#### **Rock outcrop**

*Extent of the component in the map unit:* 20 percent

*Geomorphic setting:* Drainageway on uplands

*Position on landform:* Backslope

*Parent material:* Sandstone

*Slope range:* 15 to 45 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Definition:*

Rock outcrop consists of hard bare sandstone bedrock that is exposed at the surface.

*Location of a representative area:* About 1,500 feet east and 1,200 feet south of the northwest corner of sec. 36, T. 15 N., R. 1 W.

**Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**DouB—Dougherty loamy fine sand, 0 to 3 percent slopes****Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

**Major Component Description****Dougherty and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Dune in a dunefield on sandhills on uplands

*Position on landform:* Backslope

*Parent material:* Fine-loamy eolian deposits

*Slope range:* 0 to 3 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 6.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY018OK, Deep Sand Savannah

*Typical profile:*

A—0 to 13 inches; loamy fine sand

E—13 to 26 inches; fine sand

Bt1—26 to 43 inches; sandy clay loam

Bt2—43 to 52 inches; sandy clay loam

BC—52 to 64 inches; fine sandy loam

C—64 to 80 inches; loamy fine sand

*Location of representative profile:* About 1,000 feet south and 100 feet west of the northeast corner of sec. 19, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **DouD—Dougherty loamy fine sand, 3 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Dougherty and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Dune in a dunefield on sandhills on uplands

*Position on landform:* Backslope

*Parent material:* Fine-loamy eolian deposits

*Slope range:* 3 to 8 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 6.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY018OK, Deep Sand Savannah

*Typical profile:*

Ap—0 to 9 inches; loamy fine sand

E—9 to 22 inches; loamy fine sand

Bt1—22 to 32 inches; sandy clay loam

Bt2—32 to 44 inches; fine sandy loam

C—44 to 80 inches; fine sandy loam

*Location of representative profile:* About 2,400 feet west and 700 feet south of the northeast corner of sec. 19, T. 17 N., R. 2 W.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## DUM—Dumps

### *Map Unit Setting*

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### *Major Component Description*

#### **Dumps**

*Extent of the component in the map unit:* 100 percent  
*Geomorphic setting:* Hill on uplands  
*Parent material:* Mine spoil or earthy fill  
*Slope range:* 0 to 50 percent  
*Runoff:* Very high

*Interpretive groups:*  
 Land capability classification—8s  
 Range site number and name—none assigned

#### *Definition:*

This map unit consists of trash dumps that include household refuse, tree and grass trimmings, old tires, and other trash.

*Location of a representative area:* About 200 feet west and 3,600 feet north of the southeast corner of sec. 1, T. 16 N., R. 3 W.

### *Management*

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **EasA—Easpur loam, 0 to 1 percent slopes, occasionally flooded**

### *Map Unit Setting*

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### *Major Component Description*

#### **Easpur and similar soils**

*Extent of the component in the map unit:* 93 percent  
*Geomorphic setting:* Flood plain in a valley  
*Parent material:* Fine-loamy alluvium  
*Slope range:* 0 to 1 percent  
*Runoff:* Negligible  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 10.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—2w

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

Ap—0 to 12 inches; loam

A—12 to 18 inches; loam

Bw—18 to 36 inches; loam

C—36 to 62 inches; stratified fine sandy loam to silty clay loam

Ab—62 to 80 inches; silty clay loam

*Location of representative profile:* About 2,200 feet north and 100 feet west of the southeast corner of sec. 33, T. 16 N., R. 1 E.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GadA—Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Gaddy and similar soils**

*Extent of the component in the map unit:* 85 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Sandy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Somewhat excessively drained

*Available water capacity:* About 4.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—3s

Range site number and name—080AY068OK, Sandy Bottomland

*Typical profile:*

Ap—0 to 12 inches; loamy fine sand

C1—12 to 29 inches; stratified fine sand to clay loam

C2—29 to 80 inches; stratified fine sand to clay loam

*Location of representative profile:* About 70 feet north and 2,140 east of the southwest corner of sec. 9, T. 16 N., R. 4 W.**Management***Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**GaGA—Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded****Map Unit Setting***Major land resource area:* 80A*Elevation range:* 850 to 1,050 feet*Mean annual precipitation:* 32 to 36 inches*Mean annual air temperature:* 60 to 61 degrees F*Frost-free period:* 200 to 210 days**Major Component Description****Gaddy and similar soils***Extent of the component in the map unit:* 67 percent*Geomorphic setting:* Flood plain in a valley*Parent material:* Sandy alluvium*Slope range:* 0 to 1 percent*Runoff:* Negligible*Soil depth:* More than 60 inches*Slowest permeability class of the soil:* Moderately rapid*Slowest permeability class within a depth of 60 inches:* Moderately rapid*Drainage class:* Somewhat excessively drained*Available water capacity:* About 5.0 inches*Depth to the top of the seasonal high water table:* More than 6 feet*Flooding:* Frequent*Ponding:* None*Interpretive groups:*

Land capability classification—5w

Range site number and name—080AY068OK, Sandy Bottomland

*Typical profile:*

Ap—0 to 6 inches; fine sandy loam

C—6 to 80 inches; stratified fine sand to clay loam

*Location of representative profile:* About 4,500 feet north and 100 feet west of the southeast corner of sec. 3, T. 17 N., R. 2 W.

**Gracemore and similar soils**

*Extent of the component in the map unit:* 23 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Sandy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* High

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Somewhat poorly drained

*Available water capacity:* About 5.8 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Flooding:* Frequent

*Ponding:* None

*Interpretive groups:*

Land capability classification—5w

Range site number and name—080AY095OK, Subirrigated

*Typical profile:*

Ap—0 to 12 inches; very fine sandy loam

C—12 to 80 inches; fine sand

*Location of representative profile:* About 4,000 feet north and 100 feet west of the southeast corner of sec. 3, T. 17 N., R. 2 W.

**Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**GMGE4—Grainola-Masham-Gullied land complex, 5 to 15 percent slopes****Map Unit Setting**

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

**Major Component Description****Grainola and similar soils**

*Extent of the component in the map unit:* 40 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Residuum weathered from clayey shale

*Slope range:* 5 to 15 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY810OK, Reseeded Claypan Prairie

*Typical profile:*

A—0 to 4 inches; clay loam

Btk1—4 to 15 inches; clay

Btk2—15 to 31 inches; clay

BCK—31 to 38 inches; very gravelly clay

Cr—38 to 40 inches; bedrock

*Location of representative profile:* About 2,600 feet south and 850 feet west of the northeast corner of sec. 31, T. 16 N., R. 1 E.

### **Masham and similar soils**

*Extent of the component in the map unit:* 30 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Residuum weathered from clayey shale

*Slope range:* 5 to 15 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY880OK, Reseeded Clay

*Typical profile:*

Akp—0 to 5 inches; clay loam

Bw—5 to 16 inches; clay

Cr—16 to 35 inches; bedrock

*Location of representative profile:* About 2,250 feet south and 400 feet west of the northeast corner of sec. 31, T. 16 N., R. 1 E.

### **Gullied land**

*Extent of the component in the map unit:* 20 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder, backslope, and footslope

*Parent material:* Residuum weathered from clayey shale

*Slope range:* 5 to 15 percent

*Runoff:* Very high



*Interpretive groups:*

Land capability classification—8e

Range site number and name—none assigned

*Definition:*

Gullied land consists of deep uncrossable gullies that have cut into the clayey subsoil of the Grainola and Masham soils. Unweathered shale bedrock is exposed in the bottom of the gullies.

*Location of a representative area:* About 2,100 feet south and 200 feet west of the northeast corner of sec. 31, T. 16 N., R. 1 E.

***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**GMLG—Grainola-Masham-Lucien complex, 5 to 40 percent slopes, very bouldery*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Grainola and similar soils**

*Extent of the component in the map unit:* 37 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Footslope and backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 5 to 25 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

A—0 to 5 inches; gravelly loam

Btk—5 to 24 inches; gravelly silty clay

BC—24 to 30 inches; very gravelly silty clay

Cr—30 to 40 inches; bedrock

*Location of representative profile:* About 250 feet east and 450 feet north of the southwest corner of sec. 34, T. 22 N., R. 1 E.

#### **Masham and similar soils**

*Extent of the component in the map unit:* 22 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 20 to 40 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—7e

Range site number and name—080AY080OK, Shallow Clay Prairie

*Typical profile:*

A—0 to 4 inches; silty clay loam

Bw—4 to 13 inches; silty clay

Cr—13 to 25 inches; bedrock

*Location of representative profile:* About 600 feet east and 750 feet north of the southwest corner of sec. 34, T. 22 N., R. 1 E.

#### **Lucien and similar soils**

*Extent of the component in the map unit:* 21 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder

*Parent material:* Loamy residuum weathered from sandstone

*Slope range:* 15 to 20 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 3.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*

A—0 to 6 inches; loam

Bw—6 to 17 inches; very fine sandy loam

Cr—17 to 30 inches; bedrock

*Location of representative profile:* About 700 feet east and 750 feet north of the southwest corner of sec. 34, T. 22 N., R. 1 E.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GohC—Goodnight loamy fine sand, 1 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Goodnight and similar soils**

*Extent of the component in the map unit:* 92 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Position on landform:* Summit and backslope

*Parent material:* Sandy eolian deposits

*Slope range:* 1 to 5 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Excessively drained

*Available water capacity:* About 4.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY014OK, Deep Sand

*Typical profile:*

A—0 to 9 inches; loamy fine sand

AC1—9 to 18 inches; loamy fine sand

AC2—18 to 25 inches; loamy fine sand

C1—25 to 64 inches; fine sand

C2—64 to 80 inches; fine sand

*Location of representative profile:* About 1,650 feet east and 500 feet north of the southwest corner of sec. 36, T. 17 N., R. 3 W.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## GohE—Goodnight loamy fine sand, 5 to 15 percent slopes

### *Map Unit Setting*

Major land resource area: 80A  
 Elevation range: 850 to 1,100 feet  
 Mean annual precipitation: 32 to 36 inches  
 Mean annual air temperature: 60 to 61 degrees F  
 Frost-free period: 200 to 210 days

### *Major Component Description*

#### **Goodnight and similar soils**

Extent of the component in the map unit: 92 percent  
 Geomorphic setting: Dune in a dunefield on sandhills in a valley  
 Position on landform: Summit and backslope  
 Parent material: Sandy eolian deposits  
 Slope range: 5 to 15 percent  
 Runoff: Very low  
 Soil depth: More than 60 inches  
 Slowest permeability class of the soil: Rapid  
 Slowest permeability class within a depth of 60 inches: Rapid  
 Drainage class: Excessively drained  
 Available water capacity: About 4.2 inches  
 Depth to the top of the seasonal high water table: More than 6 feet  
 Flooding: None  
 Ponding: None

#### *Interpretive groups:*

Land capability classification—6e  
 Range site number and name—080AY014OK, Deep Sand

#### *Typical profile:*

A—0 to 10 inches; loamy fine sand  
 AC1—10 to 22 inches; loamy fine sand  
 AC2—22 to 32 inches; fine sand  
 C1—32 to 52 inches; fine sand  
 C2—52 to 80 inches; fine sand

Location of representative profile: About 1,900 feet east and 550 feet north of the southwest corner of sec. 36, T. 17 N., R. 3 W.

### *Management*

Major uses: Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## GooE—Goodnight fine sand, 1 to 15 percent slopes

### *Map Unit Setting*

Major land resource area: 80A  
 Elevation range: 850 to 1,100 feet  
 Mean annual precipitation: 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Goodnight and similar soils**

*Extent of the component in the map unit:* 92 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Position on landform:* Summit and backslope

*Parent material:* Sandy eolian deposits

*Slope range:* 1 to 15 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Excessively drained

*Available water capacity:* About 4.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY022OK, Dune

*Typical profile:*

A—0 to 6 inches; fine sand

AC—6 to 20 inches; fine sand

C—20 to 80 inches; fine sand

*Location of representative profile:* About 3,000 feet south and 200 feet east of the northwest corner of sec. 17, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GooG—Goodnight fine sand, 15 to 45 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Goodnight and similar soils**

*Extent of the component in the map unit:* 92 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Position on landform:* Summit and shoulder

*Parent material:* Sandy eolian deposits

*Slope range:* 15 to 45 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Rapid

*Drainage class:* Excessively drained

*Available water capacity:* About 3.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—7e

Range site number and name—080AY022OK, Dune

*Typical profile:*

A—0 to 8 inches; fine sand

AC1—8 to 23 inches; fine sand

AC2—23 to 45 inches; fine sand

C—45 to 80 inches; fine sand

*Location of representative profile:* About 2,950 feet south and 600 feet west of the northeast corner of sec. 34, T. 18 N., R. 2 W.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GraC—Grainola silty clay loam, 3 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Grainola and similar soils**

*Extent of the component in the map unit:* 88 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

A—0 to 5 inches; silty clay loam

Btk1—5 to 18 inches; silty clay

Btk2—18 to 27 inches; silty clay

BCK—27 to 32 inches; clay

Cr—32 to 42 inches; bedrock

*Location of representative profile:* About 250 feet east and 600 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W.

***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**Grad2—Grainola silty clay loam, 5 to 8 percent slopes, eroded*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Grainola and similar soils**

*Extent of the component in the map unit:* 89 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 5 to 8 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY810OK, Reseeded Claypan Prairie

*Typical profile:*

A—0 to 4 inches; silty clay loam

Btk—4 to 26 inches; silty clay

BCk—26 to 38 inches; silty clay

Cr—38 to 48 inches; bedrock

*Location of representative profile:* About 1,050 feet east and 1,200 feet north of the southwest corner of sec. 17, T. 15 N., R. 1 E.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GrHC—Grant-Huska complex, 1 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Grant and similar soils**

*Extent of the component in the map unit:* 45 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope and summit

*Parent material:* Fine-silty residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 9.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A—0 to 7 inches; silt loam

BA—7 to 11 inches; silt loam

Bt1—11 to 17 inches; silty clay loam

Bt2—17 to 35 inches; silty clay loam

Bt3—35 to 54 inches; silty clay loam

Cr—54 to 58 inches; bedrock

*Location of representative profile:* About 2,600 feet south and 100 feet east of the northwest corner of sec. 24, T. 23 N., R. 1 E.

#### **Huska and similar soils**

*Extent of the component in the map unit:* 35 percent



*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope and summit  
*Parent material:* Clayey residuum weathered from sandstone and shale  
*Slope range:* 1 to 5 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 40 to 60 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Moderately well drained  
*Available water capacity:* About 4.4 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None  
*Salt affected:* Saline within a depth of 30 inches  
*Sodium affected:* Sodic within a depth of 30 inches

*Interpretive groups:*  
 Land capability classification—4s  
 Range site number and name—080AY091OK, Slickspot

*Typical profile:*  
 A—0 to 6 inches; silt loam  
 Btn—6 to 17 inches; silty clay  
 Btnz—17 to 32 inches; silty clay  
 Bt—32 to 40 inches; silty clay  
 BC—40 to 50 inches; silty clay  
 Cr—50 to 54 inches; bedrock  
  
*Location of representative profile:* About 2,600 feet south and 400 feet east of the northwest corner of sec. 24, T. 23 N., R. 1 E.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **GrIE—Grainola-Ironmound complex, 3 to 12 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 700 to 1,500 feet  
*Mean annual precipitation:* 26 to 40 inches  
*Mean annual air temperature:* 57 to 64 degrees F  
*Frost-free period:* 200 to 230 days

### ***Major Component Description***

#### **Grainola and similar soils**

*Extent of the component in the map unit:* 71 percent  
*Geomorphic setting:* Hillslope on hill on uplands  
*Position on landform:* Shoulder and summit  
*Parent material:* Residuum weathered from clayey shale  
*Slope range:* 3 to 12 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 6.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

Ap—0 to 7 inches; silty clay loam

BA—7 to 12 inches; silty clay

Btk1—12 to 27 inches; silty clay

Btk2—27 to 38 inches; silty clay

Cr—38 to 46 inches; bedrock

*Location of representative profile:* Oklahoma County, Oklahoma; about 280 feet north and 740 feet west of the southeast corner of sec. 28, T. 12 N., R. 2 W.

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 20 percent

*Geomorphic setting:* Hillslope on hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 12 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*

Ap—0 to 7 inches; fine sandy loam

Bw—7 to 18 inches; fine sandy loam

Cr—18 to 22 inches; bedrock

*Location of representative profile:* Oklahoma County, Oklahoma; about 180 feet north and 900 feet west of the southeast corner of sec. 28, T. 12 N., R. 2 W.

### **Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **GrLE—Grainola-Lucien complex, 5 to 12 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Grainola and similar soils**

*Extent of the component in the map unit:* 55 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 5 to 12 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 4.4 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

*Land capability classification—*6e

*Range site number and name—*080AY010OK, Claypan Prairie (north)

*Typical profile:*

A—0 to 8 inches; clay loam

Bt—8 to 20 inches; silty clay

BC—20 to 27 inches; silty clay

Cr—27 to 30 inches; bedrock

*Location of representative profile:* About 1,300 feet west and 20 feet north of the southeast corner of sec. 33, T. 21 N., R. 1 W.

#### **Lucien and similar soils**

*Extent of the component in the map unit:* 26 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Loamy residuum weathered from sandstone

*Slope range:* 5 to 12 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 2.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*

A—0 to 7 inches; loam

Bw—7 to 12 inches; loam

Cr—12 to 15 inches; bedrock

*Location of representative profile:* About 1,500 feet west and 20 feet north of the southeast corner of sec. 33, T. 21 N., R. 1 W.

**Management***Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**HaGD4—Harrah-Gullied land complex, 5 to 8 percent slopes****Map Unit Setting***Major land resource area:* 84A*Elevation range:* 900 to 1,200 feet*Mean annual precipitation:* 32 to 36 inches*Mean annual air temperature:* 60 to 61 degrees F*Frost-free period:* 200 to 210 days**Major Component Description****Harrah and similar soils***Extent of the component in the map unit:* 70 percent*Geomorphic setting:* Hill on uplands*Position on landform:* Footslope*Parent material:* Fine-loamy colluvium derived from sandstone*Slope range:* 5 to 8 percent*Runoff:* Medium*Soil depth:* More than 60 inches*Slowest permeability class of the soil:* Moderate*Slowest permeability class within a depth of 60 inches:* Moderate*Drainage class:* Well drained*Available water capacity:* About 8.2 inches*Depth to the top of the seasonal high water table:* More than 6 feet*Flooding:* None*Ponding:* None*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 4 inches; fine sandy loam

Bt1—4 to 22 inches; sandy clay loam

Bt2—22 to 42 inches; sandy clay loam

Bt3—42 to 54 inches; sandy clay loam

Bt4—54 to 72 inches; sandy clay loam

BC—72 to 80 inches; sandy clay loam

*Location of representative profile:* About 2,250 feet west and 700 feet south of the northeast corner of sec. 28, T. 15 N., R. 1 E.

#### **Gullied land**

*Extent of the component in the map unit:* 15 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Footslope

*Parent material:* Sandstone

*Slope range:* 5 to 8 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8e

Range site number and name—none assigned

*Definition:*

Gullied land consists of areas where deep, uncrossable gullies have cut into the subsoil of the Harrah soil.

*Location of a representative area:* About 725 feet south and 2,250 feet west of the northeast corner of sec. 28, T. 15 N., R. 1 E.

#### **Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

### **HarC—Harrah fine sandy loam, 3 to 5 percent slopes**

#### **Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

#### **Major Component Description**

##### **Harrah and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Footslope

*Parent material:* Fine-loamy colluvium derived from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 7.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 7 inches; fine sandy loam

E—7 to 16 inches; fine sandy loam

Bt1—16 to 39 inches; sandy clay loam

Bt2—39 to 64 inches; sandy clay loam

Bt3—64 to 72 inches; sandy clay loam

Bt4—72 to 80 inches; sandy clay loam

*Location of representative profile:* About 2,000 feet south and 1,100 feet west of the northeast corner of sec. 35, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **HarC2—Harrah fine sandy loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Harrah and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Footslope

*Parent material:* Fine-loamy colluvium derived from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 8.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam  
Bt1—8 to 30 inches; sandy clay loam  
Bt2—30 to 63 inches; sandy clay loam  
BC—63 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,650 feet east and 1,900 feet south of the northwest corner of sec. 26, T. 15 N., R. 1 W.

**Management**

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**HarG—Harrah fine sandy loam, 3 to 45 percent slopes****Map Unit Setting**

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

**Major Component Description****Harrah and similar soils**

*Extent of the component in the map unit:* 86 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope and footslope  
*Parent material:* Fine-loamy colluvium derived from sandstone  
*Slope range:* 3 to 45 percent  
*Runoff:* High  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 8.0 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—7e  
Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 6 inches; fine sandy loam  
E—6 to 12 inches; fine sandy loam  
Bt1—12 to 32 inches; sandy clay loam  
Bt2—32 to 54 inches; sandy clay loam  
Bt3—54 to 72 inches; sandy clay loam  
Bt4—72 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,475 feet east and 350 feet north of the southwest corner of sec. 12, T. 16 N., R. 1 E.



### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **HawB—Hawley loamy fine sand, 0 to 3 percent slopes, rarely flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Hawley and similar soils**

*Extent of the component in the map unit:* 94 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 1 to 3 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 8.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Rare

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY068OK, Sandy Bottomland

*Typical profile:*

Ap—0 to 10 inches; loamy fine sand

Bw1—10 to 24 inches; fine sandy loam

Bw2—24 to 38 inches; fine sandy loam

C1—38 to 49 inches; fine sandy loam

C2—49 to 80 inches; stratified loamy fine sand to silty clay loam

*Location of representative profile:* About 200 feet west and 1,300 feet north of the southeast corner of sec. 17, T. 17 N., R. 1 E.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **ICGD3—Ironmound-Coyle-Grainola complex, 5 to 8 percent slopes, severely eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 40 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and summit  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 8 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Moderately rapid  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 2.0 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None  
  
*Interpretive groups:*  
Land capability classification—7e  
Range site number and name—080AY883OK, Reseeded Shallow Prairie  
  
*Typical profile:*  
Ap—0 to 5 inches; loam  
Bw—5 to 12 inches; loam  
Cr—12 to 20 inches; bedrock

*Location of representative profile:* About 1,300 feet west and 1,300 feet north of the southeast corner of sec. 27, T. 19 N., R. 4 W.

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 30 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 8 percent  
*Runoff:* High  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 5.5 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; loam

Bt1—8 to 21 inches; clay loam

Bt2—21 to 35 inches; clay loam

Cr—35 to 40 inches; bedrock

*Location of representative profile:* About 1,100 feet west and 1,700 feet north of the southeast corner of sec. 27, T. 19 N., R. 4 W.

**Grainola and similar soils***Extent of the component in the map unit:* 15 percent*Geomorphic setting:* Hill on uplands*Position on landform:* Backslope*Parent material:* Residuum weathered from clayey shale*Slope range:* 5 to 8 percent*Runoff:* Very high*Depth to bedrock (paralithic):* 20 to 40 inches*Slowest permeability class of the soil:* Slow*Slowest permeability class within a depth of 60 inches:* Impermeable*Drainage class:* Well drained*Available water capacity:* About 4.8 inches*Depth to the top of the seasonal high water table:* More than 6 feet*Flooding:* None*Ponding:* None*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY810OK, Reseeded Claypan Prairie

*Typical profile:*

A—0 to 4 inches; clay loam

Bt1—4 to 22 inches; clay

Bt2—22 to 34 inches; clay

Cr—34 to 40 inches; bedrock

*Location of representative profile:* About 1,300 feet west and 1,000 feet north of the southeast corner of sec. 27, T. 19 N., R. 4 W.

**Management***Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**IrCE—Ironmound-Coyle complex, 5 to 15 percent slopes****Map Unit Setting***Major land resource area:* 80A*Elevation range:* 900 to 1,200 feet*Mean annual precipitation:* 32 to 36 inches*Mean annual air temperature:* 60 to 61 degrees F*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 53 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and summit  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 15 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Moderately rapid  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 2.2 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—6e  
Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*

A—0 to 6 inches; fine sandy loam  
Bw—6 to 15 inches; fine sandy loam  
Cr—15 to 20 inches; bedrock

*Location of representative profile:* About 1,075 feet west and 675 feet north of the southeast corner of sec. 15, T. 18 N., R. 3 W.

#### **Coyle and similar soils**

*Extent of the component in the map unit:* 22 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 8 to 12 percent  
*Runoff:* High  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 4.3 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—6e  
Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A—0 to 8 inches; loam  
Bt1—8 to 16 inches; clay loam  
Bt2—16 to 26 inches; clay loam  
Cr—26 to 40 inches; bedrock

*Location of representative profile:* About 1,175 feet west and 675 feet north of the southeast corner of sec. 15, T. 18 N., R. 3 W.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **IroC2—Ironmound loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and summit

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY883OK, Reseeded Shallow Prairie

*Typical profile:*

Ap—0 to 7 inches; loam

Bw—7 to 16 inches; loam

Cr—16 to 40 inches; bedrock

*Location of representative profile:* About 1,300 feet north and 500 feet west of the southeast corner of sec. 30, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

**KgfbB—Kingfisher silt loam, 1 to 3 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Kingfisher and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Residuum weathered from siltstone

*Slope range:* 1 to 3 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 7.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 10 inches; silt loam

Bt1—10 to 22 inches; silty clay loam

Bt2—22 to 32 inches; silty clay loam

BC—32 to 38 inches; silty clay loam

Cr—38 to 40 inches; bedrock

*Location of representative profile:* About 700 feet north and 375 feet west of the southeast corner of sec. 24, T. 18 N., R. 4 W.

***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**KinC2—Kingfisher loam, 3 to 5 percent slopes, eroded*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Kingfisher and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Residuum weathered from siltstone

*Slope range:* 3 to 5 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; loam

Bt1—8 to 13 inches; clay loam

Bt2—13 to 20 inches; silty clay loam

BC—20 to 27 inches; clay loam

Cr—27 to 40 inches; bedrock

*Location of representative profile:* About 100 feet east and 450 feet south of the northwest corner of sec. 5, T. 19 N., R. 2 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **KonB—Konawa loamy fine sand, 0 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Konawa and similar soils**

*Extent of the component in the map unit:* 96 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Summit and shoulder



*Parent material:* Fine-loamy eolian deposits derived from sandstone and shale

*Slope range:* 0 to 3 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 8.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

Ap—0 to 7 inches; loamy fine sand

E—7 to 12 inches; loamy fine sand

Bt1—12 to 25 inches; sandy clay loam

Bt2—25 to 38 inches; sandy clay loam

BC—38 to 52 inches; fine sandy loam

C—52 to 80 inches; loamy fine sand

*Location of representative profile:* About 2,100 feet east and 1,000 feet south of the northwest corner of sec. 17, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **KonD2—Konawa loamy fine sand, 3 to 8 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Konawa and similar soils**

*Extent of the component in the map unit:* 96 percent

*Geomorphic setting:* Terrace on uplands (fig. 12)

*Position on landform:* Backslope

*Parent material:* Fine-loamy eolian deposits derived from sandstone and shale

*Slope range:* 3 to 8 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate



**Figure 12.—Landscape of Konawa loamy fine sand, 3 to 8 percent slopes, eroded.**

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 8.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

A—0 to 9 inches; loamy fine sand

Bt1—9 to 23 inches; sandy clay loam

Bt2—23 to 38 inches; sandy clay loam

Bt3—38 to 49 inches; fine sandy loam

BC—49 to 70 inches; fine sandy loam

C—70 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,400 feet west and 800 feet north of the southeast corner of sec. 3, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**KrdA—Kirkland silt loam, 0 to 1 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Kirkland and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Tread

*Parent material:* Clayey alluvium

*Slope range:* 0 to 1 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 60 to 99 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 7.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2s

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

Ap—0 to 8 inches; silt loam

Bt1—8 to 19 inches; silty clay

Bt2—19 to 41 inches; silty clay

2Bt1—41 to 59 inches; silty clay

2Bt2—59 to 85 inches; silty clay

2Cr—85 to 96 inches; bedrock

*Location of representative profile:* About 175 feet west and 2,450 feet north of the northeast corner of sec. 6, T. 19 N., R. 4 W.

***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**KrkB—Kirkland silty clay loam, 1 to 3 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Kirkland and similar soils**

*Extent of the component in the map unit:* 90 percent  
*Geomorphic setting:* Terrace on uplands  
*Position on landform:* Tread  
*Parent material:* Clayey alluvium  
*Slope range:* 1 to 3 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 60 to 99 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Well drained  
*Available water capacity:* About 7.9 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY010OK, Claypan Prairie (north)

#### *Typical profile:*

Ap—0 to 9 inches; silty clay loam  
 Bt1—9 to 34 inches; silty clay  
 Bt2—34 to 48 inches; silty clay  
 Bt3—48 to 57 inches; silty clay  
 BC—57 to 82 inches; silty clay  
 2Cr—82 to 98 inches; bedrock

*Location of representative profile:* About 150 feet west and 1,000 feet north of the southeast corner of sec. 36, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **LarA—Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Lawrie and similar soils**

*Extent of the component in the map unit:* 94 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Fine-silty alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—1

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

Ap—0 to 8 inches; silt loam

A—8 to 20 inches; silt loam

Bt1—20 to 27 inches; silty clay loam

Bt2—27 to 38 inches; silty clay loam

Bt3—38 to 45 inches; silty clay loam

C—45 to 80 inches; loam

*Location of representative profile:* About 1,700 feet south and 125 feet west of the northeast corner of sec. 35, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **LawA—Lawrie loam, 0 to 1 percent slopes, rarely flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Lawrie and similar soils**

*Extent of the component in the map unit:* 86 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Fine-silty alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 11.6 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* Rare  
*Ponding:* None

*Interpretive groups:*  
 Land capability classification—1  
 Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*  
 Ap—0 to 10 inches; loam  
 Bt1—10 to 26 inches; silt loam  
 Bt2—26 to 34 inches; silty clay loam  
 2Bt1—34 to 51 inches; clay loam  
 2Bt2—51 to 72 inches; loam  
 2Btk—72 to 90 inches; loam

*Location of representative profile:* About 1,800 feet east and 700 feet south of the northwest corner of sec. 27, T. 17 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **LerA—Lebron clay, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Lebron and similar soils**

*Extent of the component in the map unit:* 80 percent  
*Geomorphic setting:* Flood plain in a valley  
*Parent material:* Clayey over sandy alluvium  
*Slope range:* 0 to 1 percent  
*Runoff:* High  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Very poorly drained  
*Available water capacity:* About 7.1 inches  
*Seasonal high water table:* At the soil surface



*Flooding:* Occasional

*Ponding:* Frequent

*Interpretive groups:*

Land capability classification—6w

Range site number and name—080AY090OK, Meadow

*Typical profile:*

A1—0 to 5 inches; clay

A2—5 to 14 inches; silty clay

C1—14 to 28 inches; stratified silt loam to clay

2C2—28 to 80 inches; stratified sand to loamy fine sand

*Location of representative profile:* About 3,800 feet east and 1,200 feet south of the northwest corner of sec. 9, T. 17 N., R. 2 W.

### ***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **LitB—Littleaxe fine sandy loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Littleaxe and similar soils**

*Extent of the component in the map unit:* 80 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit

*Parent material:* Fine-loamy residuum weathered from sandstone and shale

*Slope range:* 1 to 3 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 7.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 5 inches; fine sandy loam

E—5 to 9 inches; fine sandy loam



Bt1—9 to 30 inches; sandy clay loam  
 Bt2—30 to 45 inches; sandy clay loam  
 BC—45 to 58 inches; fine sandy loam  
 Cr—58 to 60 inches; bedrock

*Location of representative profile:* About 1,950 feet north and 300 feet east of the southwest corner of sec. 13, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **LitC2—Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Littleaxe and similar soils**

*Extent of the component in the map unit:* 80 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder  
*Parent material:* Fine-loamy residuum weathered from sandstone and shale  
*Slope range:* 3 to 5 percent  
*Runoff:* Low  
*Depth to bedrock (paralithic):* 40 to 60 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 7.2 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—3e  
 Range site number and name—084AY876OK, Reseeded Sandy Savannah

#### *Typical profile:*

Ap—0 to 6 inches; fine sandy loam  
 Bt1—6 to 17 inches; sandy clay loam  
 Bt2—17 to 41 inches; sandy clay loam  
 Bt3—41 to 52 inches; sandy clay loam  
 Cr—52 to 60 inches; bedrock

*Location of representative profile:* About 1,450 feet south and 1,150 feet east of the northwest corner of sec. 35, T. 17 N., R. 1 E.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **M-W—Miscellaneous water**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Miscellaneous water**

*Extent of the component in the map unit:* 100 percent

*Interpretive groups:*

Land capability classification—none assigned

Range site number and name—none assigned

*Definition:*

This map unit consists of areas of wastewater, such as sewage lagoons and industrial wastewater.

*Location of a representative area:* About 2,640 feet east and 2,640 feet south of the northwest corner of sec. 11, T. 17 N., R. 2 W.

### ***Management***

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **MaID—Masham-Ironmound complex, 5 to 15 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Masham and similar soils**

*Extent of the component in the map unit:* 52 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 5 to 15 percent

*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Slow  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 2.7 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*  
 Land capability classification—6e  
 Range site number and name—080AY080OK, Shallow Clay Prairie

*Typical profile:*  
 A—0 to 4 inches; silty clay loam  
 Bw—4 to 16 inches; silty clay  
 Cr—16 to 35 inches; bedrock

*Location of representative profile:* About 2,500 feet south and 1,850 feet west of the northeast corner of sec. 22, T. 15 N., R. 1 W.

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 27 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and backslope  
*Parent material:* Loamy residuum weathered from sandstone  
*Slope range:* 5 to 15 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 1.9 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*  
 Land capability classification—6e  
 Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*  
 A—0 to 6 inches; loam  
 Bw—6 to 11 inches; loam  
 Cr—11 to 36 inches; bedrock

*Location of representative profile:* About 2,150 feet west and 2,150 feet south of the northeast corner of sec. 22, T. 15 N., R. 1 W.

### **Management**

*Major uses:* Rangeland (fig. 13)

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



Figure 13.—An area of native prairie on Masham-Ironmound complex, 5 to 15 percent slopes, below an area of Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, with post oak-blackjack oak tree cover.

## **MaIG—Masham-Ironmound complex, 15 to 40 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Masham and similar soils**

*Extent of the component in the map unit:* 73 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope  
*Parent material:* Clayey residuum weathered from clayey shale  
*Slope range:* 20 to 40 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Slow  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 2.0 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—7e

Range site number and name—080AY080OK, Shallow Clay Prairie

*Typical profile:*

A—0 to 4 inches; clay loam

Bw—4 to 12 inches; clay

Cr—12 to 20 inches; bedrock

*Location of representative profile:* About 100 feet south and 800 feet east of the northwest corner of sec. 36, T. 15 N., R. 1 W.

#### **Ironmound and similar soils**

*Extent of the component in the map unit:* 17 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Loamy residuum weathered from sandstone

*Slope range:* 15 to 30 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 2.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—7e

Range site number and name—080AY083OK, Shallow Prairie

*Typical profile:*

A—0 to 6 inches; loam

Bw—6 to 15 inches; loam

Cr—15 to 20 inches; bedrock

*Location of representative profile:* About 100 feet south and 800 feet east of the northwest corner of sec. 36, T. 15 N., R. 1 W.

### **Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **MinB—Minco very fine sandy loam, 1 to 3 percent slopes**

### **Map Unit Setting**

*Major land resource area:* 80A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches



*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Minco and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Tread

*Parent material:* Coarse-silty eolian deposits

*Slope range:* 1 to 3 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 11 inches; very fine sandy loam

Bw1—11 to 26 inches; very fine sandy loam

Bw2—26 to 37 inches; very fine sandy loam

Bw3—37 to 58 inches; very fine sandy loam

C—58 to 80 inches; very fine sandy loam

*Location of representative profile:* About 2,250 feet west and 725 feet north of the southeast corner of sec. 5, T. 16 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **MinC—Minco very fine sandy loam, 3 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Minco and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Riser

*Parent material:* Coarse-silty eolian deposits

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A—0 to 10 inches; very fine sandy loam

Bw1—10 to 29 inches; very fine sandy loam

Bw2—29 to 40 inches; very fine sandy loam

Bw3—40 to 54 inches; very fine sandy loam

C—54 to 80 inches; very fine sandy loam

*Location of representative profile:* About 1,200 feet south and 2,500 feet west of the northeast corner of sec. 9, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **MinD—Minco very fine sandy loam, 5 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Minco and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Riser

*Parent material:* Coarse-silty eolian deposits

*Slope range:* 5 to 8 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.2 inches



*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A—0 to 12 inches; very fine sandy loam

Bw1—12 to 26 inches; very fine sandy loam

Bw2—26 to 47 inches; very fine sandy loam

Bw3—47 to 67 inches; very fine sandy loam

C—67 to 80 inches; very fine sandy loam

*Location of representative profile:* About 2,575 feet south and 1,175 feet west of the northeast corner of sec. 9, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **MinF—Minco very fine sandy loam, 8 to 20 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Minco and similar soils**

*Extent of the component in the map unit:* 91 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Riser

*Parent material:* Coarse-silty eolian deposits

*Slope range:* 8 to 20 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 11.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

A1—0 to 9 inches; very fine sandy loam  
 A2—9 to 19 inches; very fine sandy loam  
 Bw1—19 to 39 inches; very fine sandy loam  
 Bw2—39 to 64 inches; very fine sandy loam  
 Bw3—64 to 70 inches; very fine sandy loam  
 C—70 to 80 inches; very fine sandy loam

*Location of representative profile:* About 3,000 feet south and 375 feet east of the northwest corner of sec. 34, T. 18 N., R. 2 W.

**Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

**MIIA—Miller silty clay, 0 to 1 percent slopes, occasionally flooded****Map Unit Setting**

*Major land resource area:* 80A  
*Elevation range:* 850 to 1,050 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

**Major Component Description****Miller and similar soils**

*Extent of the component in the map unit:* 95 percent  
*Geomorphic setting:* Flood plain in a valley  
*Parent material:* Clayey alluvium  
*Slope range:* 0 to 1 percent  
*Runoff:* High  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Moderately well drained  
*Available water capacity:* About 9.4 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* Occasional  
*Ponding:* None

*Interpretive groups:*

Land capability classification—3w  
 Range site number and name—080AY045OK, Heavy Bottomland

*Typical profile:*

Ap—0 to 9 inches; silty clay  
 Bw1—9 to 15 inches; silty clay  
 Bw2—15 to 27 inches; silty clay  
 Bw3—27 to 41 inches; silty clay  
 Bw4—41 to 55 inches; silty clay  
 C—55 to 80 inches; silty clay

*Location of representative profile:* About 2,500 feet north and 375 feet west of the southeast corner of sec. 7, T. 18 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **MulC—Mulhall loam, 3 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Mulhall and similar soils**

*Extent of the component in the map unit:* 88 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Footslope

*Parent material:* Fine-loamy colluvium derived from sandstone and shale

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 60 to 80 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 9.4 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 11 inches; loam

BA—11 to 17 inches; loam

Bt1—17 to 32 inches; sandy clay loam

Bt2—32 to 40 inches; sandy clay loam

Bt3—40 to 70 inches; sandy clay loam

2Cr—70 to 82 inches; bedrock

*Location of representative profile:* About 1,250 feet north and 800 feet west of the southeast corner of sec. 5, T. 19 N., R. 2 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland (fig. 14), and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."



Figure 14.—Native pasture on Mulhall loam, 3 to 5 percent slopes.

## MulC2—Mulhall loam, 3 to 5 percent slopes, eroded

### *Map Unit Setting*

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### *Major Component Description*

#### **Mulhall and similar soils**

*Extent of the component in the map unit:* 88 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Footslope  
*Parent material:* Fine-loamy colluvium derived from sandstone and shale  
*Slope range:* 3 to 5 percent  
*Runoff:* Low  
*Depth to bedrock (paralithic):* 60 to 80 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 9.2 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None  
  
*Interpretive groups:*  
 Land capability classification—3e  
 Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 10 inches; loam  
 Bt1—10 to 22 inches; sandy clay loam  
 Bt2—22 to 36 inches; sandy clay loam  
 Bt3—36 to 54 inches; sandy clay loam  
 Bt4—54 to 80 inches; sandy clay loam  
 2Cr—80 to 90 inches; bedrock

*Location of representative profile:* About 1,000 feet west and 100 feet north of the southeast corner of sec. 18, T. 18 N., R. 2 W.

**Management**

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**NavA—Navina fine sandy loam, 0 to 1 percent slopes****Map Unit Setting**

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

**Major Component Description****Navina and similar soils**

*Extent of the component in the map unit:* 96 percent  
*Geomorphic setting:* Terrace on uplands  
*Position on landform:* Tread  
*Parent material:* Fine-loamy alluvium  
*Slope range:* 0 to 1 percent  
*Runoff:* Negligible  
*Soil depth:* More than 60 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderate  
*Drainage class:* Well drained  
*Available water capacity:* About 9.7 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—1  
 Range site number and name—080AY073OK, Sandy Prairie

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam  
 BA—8 to 14 inches; fine sandy loam  
 Bt1—14 to 33 inches; sandy clay loam  
 Bt2—33 to 41 inches; sandy clay loam  
 BC—41 to 71 inches; fine sandy loam  
 C—71 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,800 feet north and 325 feet west of the southeast corner of sec. 9, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **NavB—Navina fine sandy loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Navina and similar soils**

*Extent of the component in the map unit:* 96 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Tread

*Parent material:* Fine-loamy alluvium

*Slope range:* 1 to 3 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 9.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

#### *Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY073OK, Sandy Prairie

#### *Typical profile:*

Ap—0 to 7 inches; fine sandy loam

BA—7 to 16 inches; fine sandy loam

Bt1—16 to 37 inches; sandy clay loam

Bt2—37 to 60 inches; fine sandy loam

BC—60 to 71 inches; fine sandy loam

C—71 to 80 inches; fine sandy loam

*Location of representative profile:* About 150 feet east and 225 feet north of the southwest corner of sec. 33, T. 18 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."



## **NeGD4—Newalla-Gullied land complex, 3 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Newalla and similar soils**

*Extent of the component in the map unit:* 75 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope  
*Parent material:* Fine-loamy residuum weathered from sandstone over clayey residuum weathered from clayey shale  
*Slope range:* 3 to 8 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 40 to 60 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Moderately well drained  
*Available water capacity:* About 6.3 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—3e  
Range site number and name—084AY876OK, Reseeded Sandy Savannah

#### *Typical profile:*

Ap—0 to 6 inches; fine sandy loam  
Bt—6 to 11 inches; sandy clay loam  
2Bt—11 to 28 inches; clay  
2BCk—28 to 46 inches; clay  
2Cr—46 to 60 inches; bedrock

*Location of representative profile:* About 1,150 feet east and 2,400 feet south of the northwest corner of sec. 34, T. 16 N., R. 1 W.

#### **Gullied land**

*Extent of the component in the map unit:* 15 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and backslope  
*Parent material:* Sandstone and shale  
*Slope range:* 3 to 8 percent  
*Runoff:* Very high

#### *Interpretive groups:*

Land capability classification—8e  
Range site number and name—none assigned



*Definition:*

Gullied land consists of deep uncrossable gullies that have cut into the clayey subsoil of the Newalla soil. Unweathered shale and sandstone bedrock is exposed in the bottom of the gullies.

*Location of a representative area:* About 1,150 feet east and 2,450 feet south of the northwest corner of sec. 35, T. 16 N., R. 1 W.

**Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

**NewB—Newalla fine sandy loam, 1 to 3 percent slopes****Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

**Major Component Description****Newalla and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Fine-loamy residuum weathered from sandstone over clayey residuum weathered from clayey shale

*Slope range:* 1 to 3 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Moderately well drained

*Available water capacity:* About 7.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3s

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

Ap—0 to 6 inches; fine sandy loam

E—6 to 12 inches; fine sandy loam

Bt—12 to 19 inches; sandy clay loam

2Bt—19 to 41 inches; clay

2BCk—41 to 46 inches; clay

2Cr—46 to 52 inches; bedrock

*Location of representative profile:* About 1,700 feet west and 250 feet north of the southeast corner of sec. 16, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **NorA—Norge silt loam, 0 to 1 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Norge and similar soils**

*Extent of the component in the map unit:* 93 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Tread

*Parent material:* Fine-silty alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 11.4 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—1

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 11 inches; silt loam

A—11 to 16 inches; silt loam

BA—16 to 23 inches; silt loam

Bt1—23 to 43 inches; silty clay loam

Bt2—43 to 61 inches; silty clay loam

Bt3—61 to 80 inches; silty clay loam

*Location of representative profile:* About 1,100 feet east and 400 feet south of the northwest corner of sec. 4, T. 17 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## NorB—Norge silt loam, 1 to 3 percent slopes

### *Map Unit Setting*

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### *Major Component Description*

#### **Norge and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Tread

*Parent material:* Fine-silty alluvium

*Slope range:* 1 to 3 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 11.4 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 12 inches; silt loam

BA—12 to 18 inches; silt loam

Bt1—18 to 24 inches; silty clay loam

Bt2—24 to 45 inches; silty clay loam

Bt3—45 to 62 inches; silty clay loam

BC—62 to 80 inches; silty clay loam

*Location of representative profile:* About 100 feet west and 750 feet south of the northeast corner of sec. 28, T. 19 N., R. 4 W.

### *Management*

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## NorC2—Norge silt loam, 3 to 5 percent slopes, eroded

### *Map Unit Setting*

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Norge and similar soils**

*Extent of the component in the map unit:* 88 percent

*Geomorphic setting:* Terrace on uplands

*Position on landform:* Tread

*Parent material:* Fine-silty alluvium

*Slope range:* 3 to 5 percent

*Runoff:* Medium

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 11.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; silt loam

Bt1—8 to 15 inches; silty clay loam

Bt2—15 to 33 inches; silty clay loam

Bt3—33 to 43 inches; silty clay loam

Bt4—43 to 65 inches; silty clay loam

C—65 to 80 inches; clay loam

*Location of representative profile:* About 450 feet west and 550 feet south of the northeast corner of sec. 28, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **OWHD—Oil waste land-Huska complex, 1 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Oil waste land**

*Extent of the component in the map unit:* 50 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 1 to 8 percent

*Runoff:* Very high

*Salt affected:* Saline within a depth of 30 inches

*Sodium affected:* Sodic within a depth of 30 inches

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Description:*

Oil waste land consists of areas of soil that have been damaged by the accumulation of brine and oily waste. The soil has been denuded of vegetation, and very severe erosion has resulted. Many areas are eroded to bedrock.

*Location of a representative area:* About 700 feet north and 100 feet west of the southeast corner of sec. 18, T. 19 N., R. 4 W.

#### **Huska and similar soils**

*Extent of the component in the map unit:* 30 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 1 to 3 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Moderately well drained

*Available water capacity:* About 5.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Salt affected:* Saline within a depth of 30 inches

*Sodium affected:* Sodic within a depth of 30 inches

*Interpretive groups:*

Land capability classification—4s

Range site number and name—080AY091OK, Slickspot

*Typical profile:*

Ap—0 to 8 inches; silt loam

B<sub>tn</sub>—8 to 19 inches; silty clay

B<sub>tk1</sub>—19 to 40 inches; silty clay

B<sub>tk2</sub>—40 to 51 inches; silty clay loam

BC—51 to 59 inches; silty clay loam

Cr—59 to 80 inches; bedrock

*Location of representative profile:* About 600 feet north and 200 feet west of the southeast corner of sec. 18, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **PieB—Piedmont silty clay loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Piedmont and similar soils**

*Extent of the component in the map unit:* 92 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 1 to 3 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 5.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

A—0 to 8 inches; silty clay loam

Btss1—8 to 17 inches; silty clay

Btss2—17 to 27 inches; silty clay

BCK—27 to 32 inches; silty clay loam

Cr—32 to 40 inches; bedrock

*Location of representative profile:* About 200 feet east and 150 feet south of the northwest corner of sec. 18, T. 18 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **PieC2—Piedmont silty clay loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Piedmont and similar soils**

*Extent of the component in the map unit:* 93 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Clayey residuum weathered from clayey shale  
*Slope range:* 3 to 5 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 4.1 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—3e  
Range site number and name—080AY810OK, Reseeded Claypan Prairie

#### *Typical profile:*

A—0 to 7 inches; silty clay loam  
Btss—7 to 14 inches; silty clay loam  
Btk—14 to 27 inches; clay  
Cr—27 to 40 inches; bedrock

*Location of representative profile:* About 1,750 feet west and 100 feet south of the northeast corner of sec. 18, T. 18 N., R. 2 W.

### ***Management***

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **PIT—Pits**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches



*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Pits**

*Extent of the component in the map unit:* 100 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Sandy eolian deposits

*Slope range:* 0 to 4 percent

*Runoff:* High

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Definition:*

This map unit consists of areas where sandy soils are being removed as a source of sand for construction and concrete mix. Some areas are used for the removal of shale or soil material for road construction.

*Location of a representative area:* About 1,700 feet north and 2,000 feet east of the southwest corner of sec. 16, T. 17 N., R. 2 W.

### ***Management***

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **PukA—Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Pulaski and similar soils**

*Extent of the component in the map unit:* 85 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 8.8 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Frequent

*Ponding:* None

*Interpretive groups:*

Land capability classification—5w

Range site number and name—084AY050OK, Loamy Bottomland

*Typical profile:*

A—0 to 8 inches; fine sandy loam

C1—8 to 28 inches; fine sandy loam

C2—28 to 80 inches; stratified loamy fine sand to loam

*Location of representative profile:* About 300 feet east and 50 feet north of the southwest corner of sec. 14, T. 15 N., R. 1 W.

**Management**

*Major uses:* Hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **PulA—Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded**

**Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

**Major Component Description****Pulaski and similar soils**

*Extent of the component in the map unit:* 85 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 9.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—2w

Range site number and name—084AY050OK, Loamy Bottomland

*Typical profile:*

A1—0 to 10 inches; fine sandy loam

A2—10 to 14 inches; fine sandy loam

C1—14 to 36 inches; fine sandy loam

C2—36 to 80 inches; stratified loamy fine sand to loam

*Location of representative profile:* About 4,900 feet south and 300 feet west of the northeast corner of sec. 29, T. 16 N., R. 1 E.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **RenB—Renfrow silt loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Renfrow and similar soils**

*Extent of the component in the map unit:* 89 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and shoulder

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 1 to 3 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 60 to 96 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 10.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

Ap—0 to 11 inches; silt loam

BA—11 to 19 inches; silty clay loam

Bt—19 to 33 inches; silty clay

Btk—33 to 66 inches; silty clay

BC—66 to 72 inches; silty clay

Cr—72 to 80 inches; bedrock

*Location of representative profile:* About 500 feet west and 1,200 feet south of the northeast corner of sec. 34, T. 19 N., R. 3 W.

### ***Management***

*Major uses:* Cropland (fig. 15), hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



Figure 15.—Wheat growing on Renfrow silt loam, 1 to 3 percent slopes.

## **RenC—Renfrow silt loam, 3 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Renfrow and similar soils**

*Extent of the component in the map unit:* 89 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope  
*Parent material:* Clayey residuum weathered from clayey shale  
*Slope range:* 3 to 5 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 60 to 96 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Well drained  
*Available water capacity:* About 10.5 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY010OK, Claypan Prairie (north)

*Typical profile:*

Ap—0 to 10 inches; silt loam

BA—10 to 16 inches; silt loam

Bt1—16 to 27 inches; silty clay loam

Bt2—27 to 38 inches; silty clay loam

Bt3—38 to 67 inches; silty clay

Cr—67 to 80 inches; bedrock

*Location of representative profile:* About 2,100 feet west and 2,400 feet north of the southeast corner of sec. 3, T. 19 N., R. 2 W.

***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **RewC2—Renfrow silty clay loam, 3 to 5 percent slopes, eroded**

***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Renfrow and similar soils**

*Extent of the component in the map unit:* 84 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 60 to 96 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 10.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY810OK, Reseeded Claypan Prairie

*Typical profile:*

Ap—0 to 10 inches; silty clay loam



Bt1—10 to 24 inches; silty clay  
 Bt2—24 to 37 inches; silty clay  
 Bt3—37 to 54 inches; silty clay  
 BC—54 to 63 inches; silty clay  
 Cr—63 to 80 inches; bedrock

*Location of representative profile:* About 2,300 feet south and 2,200 feet east of the northwest corner of sec. 22, T. 19 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **RinB—Renthin silt loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Renthin and similar soils**

*Extent of the component in the map unit:* 81 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Clayey residuum weathered from clayey shale  
*Slope range:* 1 to 3 percent  
*Runoff:* Very high  
*Depth to bedrock (paralithic):* 40 to 60 inches  
*Slowest permeability class of the soil:* Very slow  
*Slowest permeability class within a depth of 60 inches:* Very slow  
*Drainage class:* Well drained  
*Available water capacity:* About 8.8 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—2e  
 Range site number and name—080AY010OK, Claypan Prairie (north)

#### *Typical profile:*

Ap—0 to 7 inches; silt loam  
 BA—7 to 12 inches; silty clay loam  
 Bt—12 to 21 inches; silty clay loam  
 Btk1—21 to 32 inches; silty clay  
 Btk2—32 to 54 inches; silty clay  
 Cr—54 to 60 inches; bedrock

*Location of representative profile:* About 2,500 feet east and 500 feet south of the northwest corner of sec. 17, T. 17 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **RnnC2—Renthin silty clay loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Renthin and similar soils**

*Extent of the component in the map unit:* 80 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Clayey residuum weathered from clayey shale

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Well drained

*Available water capacity:* About 8.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY810OK, Reseeded Claypan Prairie

*Typical profile:*

Ap—0 to 10 inches; silt loam

Bt—10 to 20 inches; silty clay loam

Btk1—20 to 33 inches; silty clay

Btk2—33 to 45 inches; silty clay

BCK—45 to 50 inches; gravelly silty clay

Cr—50 to 60 inches; bedrock

*Location of representative profile:* About 1,700 feet east and 2,000 feet south of the northwest corner of sec. 17, T. 17 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



## **SDGD4—Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 32 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 3 to 8 percent  
*Runoff:* Medium  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 3.5 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

#### *Interpretive groups:*

Land capability classification—4e  
Range site number and name—084AY876OK, Reseeded Sandy Savannah

#### *Typical profile:*

Ap—0 to 5 inches; fine sandy loam  
Bt1—5 to 12 inches; sandy clay loam  
Bt2—12 to 22 inches; sandy clay loam  
Cr—22 to 36 inches; bedrock

*Location of representative profile:* About 1,100 feet north and 1,250 feet west of the southeast corner of sec. 11, T. 15 N., R. 1 E.

#### **Darsil and similar soils**

*Extent of the component in the map unit:* 31 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 3 to 8 percent  
*Runoff:* High  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Rapid  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Excessively drained  
*Available water capacity:* About 1.0 inch  
*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY889OK, Reseeded Shallow Savannah

*Typical profile:*

Ap—0 to 4 inches; loamy fine sand

EC—4 to 12 inches; loamy fine sand

Cr—12 to 24 inches; bedrock

*Location of representative profile:* About 1,075 feet north and 1,200 feet west of the southeast corner of sec. 11, T. 15 N., R. 1 E.

### **Gullied land**

*Extent of the component in the map unit:* 23 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Sandstone

*Slope range:* 3 to 8 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8e

Range site number and name—none assigned

*Definition:*

Gullied land consists of deep uncrossable gullies that have cut through the subsoil of the Stephenville and Darsil soils. Unweathered sandstone and shale is exposed in the bottom of the gullies.

*Location of a representative area:* About 1,050 feet north and 1,225 feet west of the southeast corner of sec. 11, T. 15 N., R. 1 E.

### **Management**

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **SDND—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes**

### **Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### **Major Component Description**

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 44 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 8 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 4.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 7 inches; fine sandy loam

E—7 to 13 inches; loamy fine sand

Bt—13 to 28 inches; sandy clay loam

Cr—28 to 36 inches; bedrock

*Location of representative profile:* About 400 feet west and 2,400 feet north of the southeast corner of sec. 14, T. 15 N., R. 1 W.

#### **Darsil and similar soils**

*Extent of the component in the map unit:* 29 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder

*Parent material:* Fine-silty alluvium

*Slope range:* 3 to 8 percent

*Runoff:* High

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Excessively drained

*Available water capacity:* About 1.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY089OK, Shallow Savannah

*Typical profile:*

A—0 to 5 inches; fine sandy loam

EC—5 to 18 inches; loamy fine sand

Cr—18 to 20 inches; bedrock

*Location of representative profile:* About 450 feet west and 2,400 feet north of the southeast corner of sec. 14, T. 15 N., R. 1 W.

#### **Newalla and similar soils**

*Extent of the component in the map unit:* 21 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Fine-loamy residuum weathered from sandstone over clayey residuum weathered from clayey shale

*Slope range:* 3 to 8 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Moderately well drained

*Available water capacity:* About 6.6 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 4 inches; fine sandy loam

E—4 to 8 inches; fine sandy loam

Bt—8 to 13 inches; sandy clay loam

2Bt—13 to 27 inches; clay

2Btk—27 to 48 inches; clay

2Cr—48 to 80 inches; bedrock

*Location of representative profile:* About 600 feet west and 2,400 feet north of the southeast corner of sec. 14, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **SDND2—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 44 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 8 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 4.8 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 7 inches; fine sandy loam  
 Bt1—7 to 12 inches; sandy clay loam  
 Bt2—12 to 25 inches; sandy clay loam  
 BC—25 to 30 inches; sandy clay loam  
 Cr—30 to 36 inches; bedrock

*Location of representative profile:* About 2,100 feet west and 650 feet south of the northeast corner of sec. 27, T. 15 N., R. 1 W.

**Darsil and similar soils**

*Extent of the component in the map unit:* 33 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 3 to 8 percent  
*Runoff:* High  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Rapid  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Excessively drained  
*Available water capacity:* About 0.9 inch  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY889OK, Reseeded Shallow Savannah

*Typical profile:*

Ap—0 to 6 inches; fine sandy loam  
 EC—6 to 11 inches; loamy fine sand  
 Cr—11 to 24 inches; bedrock

*Location of representative profile:* About 2,100 feet west and 600 feet south of the northeast corner of sec. 27, T. 15 N., R. 1 W.

**Newalla and similar soils**

*Extent of the component in the map unit:* 20 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope  
*Parent material:* Fine-loamy residuum weathered from sandstone over clayey residuum weathered from clayey shale

*Slope range:* 3 to 8 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Moderately well drained

*Available water capacity:* About 6.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 5 inches; fine sandy loam

Bt—5 to 12 inches; clay loam

2Bt—12 to 26 inches; silty clay

2BC—26 to 40 inches; silty clay

2Cr—40 to 80 inches; bedrock

*Location of representative profile:* About 2,100 feet west and 550 feet south of the northeast corner of sec. 27, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **SlaB—Slaughterville fine sandy loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Slaughterville and similar soils**

*Extent of the component in the map unit:* 95 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Parent material:* Coarse-loamy eolian deposits

*Slope range:* 1 to 3 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 7.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY073OK, Sandy Prairie

*Typical profile:*

Ap—0 to 11 inches; fine sandy loam

A—11 to 20 inches; fine sandy loam

Bw1—20 to 34 inches; fine sandy loam

Bw2—34 to 42 inches; fine sandy loam

C1—42 to 53 inches; loamy fine sand

C2—53 to 80 inches; fine sandy loam

*Location of representative profile:* About 4,825 feet east and 425 feet north of the southwest corner of sec. 36, T. 17 N., R. 4 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **SlaD—Slaughterville fine sandy loam, 3 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Slaughterville and similar soils**

*Extent of the component in the map unit:* 95 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Parent material:* Coarse-loamy eolian deposits

*Slope range:* 3 to 8 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 7.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—080AY073OK, Sandy Prairie



*Typical profile:*

Ap—0 to 8 inches; fine sandy loam

A—8 to 16 inches; fine sandy loam

Bw1—16 to 34 inches; fine sandy loam

Bw2—34 to 50 inches; fine sandy loam

C—50 to 80 inches; loamy fine sand

*Location of representative profile:* About 1,650 feet west and 625 feet south of the northeast corner of sec. 3, T. 16 N., R. 4 W.

***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**SlaF—Slaughterville fine sandy loam, 8 to 20 percent slopes*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Slaughterville and similar soils**

*Extent of the component in the map unit:* 95 percent

*Geomorphic setting:* Dune in a dunefield on sandhills in a valley

*Parent material:* Coarse-loamy eolian deposits

*Slope range:* 8 to 20 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 7.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—6e

Range site number and name—080AY073OK, Sandy Prairie

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam

A—8 to 16 inches; fine sandy loam

Bw1—16 to 34 inches; fine sandy loam

Bw2—34 to 48 inches; fine sandy loam

C1—48 to 63 inches; loamy fine sand

C2—63 to 80 inches; loamy fine sand

*Location of representative profile:* About 1,875 feet west and 3,250 feet south of the northeast corner of sec. 3, T. 16 N., R. 4 W.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **StDC—Stephenville-Darsil complex, 1 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 55 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 4.5 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 6 inches; fine sandy loam

E—6 to 14 inches; fine sandy loam

Bt1—14 to 23 inches; sandy clay loam

Bt2—23 to 30 inches; fine sandy loam

Cr—30 to 40 inches; bedrock

*Location of representative profile:* About 700 feet east and 700 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W.

#### **Darsil and similar soils**

*Extent of the component in the map unit:* 30 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 5 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Excessively drained

*Available water capacity:* About 1.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY089OK, Shallow Savannah

*Typical profile:*

Ap—0 to 4 inches; fine sandy loam

EC—4 to 15 inches; loamy fine sand

Cr—15 to 20 inches; bedrock

*Location of representative profile:* About 850 feet east and 700 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **StDC2—Stephenville-Darsil complex, 1 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 55 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 6.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam

Bt1—8 to 21 inches; sandy clay loam

Bt2—21 to 32 inches; sandy clay loam

BC—32 to 38 inches; fine sandy loam

Cr—38 to 44 inches; bedrock

*Location of representative profile:* About 475 feet north and 50 feet east of the southwest corner of sec. 34, T. 15 N., R. 1 W.

### **Darsil and similar soils**

*Extent of the component in the map unit:* 30 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder

*Parent material:* Residuum weathered from sandstone

*Slope range:* 1 to 5 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 10 to 20 inches

*Slowest permeability class of the soil:* Rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Excessively drained

*Available water capacity:* About 1.4 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—084AY889OK, Reseeded Shallow Savannah

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam

EC—8 to 16 inches; loamy fine sand

Cr—16 to 30 inches; bedrock

*Location of representative profile:* About 375 feet north and 50 feet east of the southwest corner of sec. 34, T. 15 N., R. 1 W.

### **Management**

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **StDE—Stephenville-Darsil complex, 5 to 15 percent slopes**

### **Map Unit Setting**

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 50 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 8 to 15 percent  
*Runoff:* Medium  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderately rapid  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 4.1 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None  
  
*Interpretive groups:*  
Land capability classification—6e  
Range site number and name—084AY076OK, Sandy Savannah (central)

#### *Typical profile:*

A—0 to 7 inches; fine sandy loam  
E—7 to 14 inches; fine sandy loam  
Bt—14 to 27 inches; sandy clay loam  
Cr—27 to 40 inches; bedrock

*Location of representative profile:* About 450 feet west and 2,100 feet north of the southeast corner of sec. 26, T. 15 N., R. 1 E.

#### **Darsil and similar soils**

*Extent of the component in the map unit:* 40 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 8 percent  
*Runoff:* High  
*Depth to bedrock (paralithic):* 10 to 20 inches  
*Slowest permeability class of the soil:* Rapid  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Excessively drained  
*Available water capacity:* About 1.4 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None  
  
*Interpretive groups:*  
Land capability classification—6e  
Range site number and name—084AY089OK, Shallow Savannah

*Typical profile:*

A—0 to 7 inches; loamy fine sand  
 EC—7 to 16 inches; loamy fine sand  
 Cr—16 to 20 inches; bedrock

*Location of representative profile:* About 600 feet west and 2,100 feet north of the southeast corner of sec. 26, T. 15 N., R. 1 E.

**Management**

*Major uses:* Pastureland and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**SteB—Stephenville fine sandy loam, 1 to 3 percent slopes****Map Unit Setting**

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

**Major Component Description****Stephenville and similar soils**

*Extent of the component in the map unit:* 94 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Shoulder and summit  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 1 to 3 percent  
*Runoff:* Low  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderate  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 5.4 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—2e  
 Range site number and name—084AY076OK, Sandy Savannah (central)

*Typical profile:*

A—0 to 6 inches; fine sandy loam  
 E—6 to 12 inches; fine sandy loam  
 Bt1—12 to 22 inches; sandy clay loam  
 Bt2—22 to 35 inches; sandy clay loam  
 Cr—35 to 40 inches; bedrock

*Location of representative profile:* About 400 feet east and 1,400 feet south of the northwest corner of sec. 29, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **SteC2—Stephenville fine sandy loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 92 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 20 to 40 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately slow

*Drainage class:* Well drained

*Available water capacity:* About 4.7 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—084AY876OK, Reseeded Sandy Savannah

*Typical profile:*

Ap—0 to 8 inches; fine sandy loam

Bt—8 to 29 inches; sandy clay loam

Cr—29 to 40 inches; bedrock

*Location of representative profile:* About 600 feet west and 400 feet north of the southeast corner of sec. 2, T. 15 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."



## **SUND—Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 84A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Stephenville and similar soils**

*Extent of the component in the map unit:* 35 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope range:* 5 to 8 percent  
*Runoff:* Medium  
*Depth to bedrock (paralithic):* 20 to 40 inches  
*Slowest permeability class of the soil:* Moderately rapid  
*Slowest permeability class within a depth of 60 inches:* Moderately slow  
*Drainage class:* Well drained  
*Available water capacity:* About 4.5 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*  
 Land capability classification—4e  
 Range site number and name—none assigned

*Typical profile:*  
 Ap—0 to 9 inches; fine sandy loam  
 Bt—9 to 28 inches; sandy clay loam  
 Cr—28 to 40 inches; bedrock

*Location of representative profile:* About 2,600 feet west and 350 feet north of the southeast corner of sec. 26, T. 12 N., R. 2 W.

#### **Urban land**

*Extent of the component in the map unit:* 30 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Mine spoil or earthy fill derived from sandstone  
*Slope range:* 1 to 8 percent  
*Runoff:* Very high

*Interpretive groups:*  
 Land capability classification—8s  
 Range site number and name—none assigned

#### ***Definition:***

Urban land mostly consists of residential and business areas, paved roads, streets, and parking areas.

*Location of a representative area:* About 2,600 feet west and 100 feet north of the southeast corner of sec. 26, T. 12 N., R. 2 W.

#### **Newalla and similar soils**

*Extent of the component in the map unit:* 15 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope and summit

*Parent material:* Fine-loamy residuum weathered from sandstone over clayey residuum weathered from clayey shale

*Slope range:* 5 to 8 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Very slow

*Drainage class:* Moderately well drained

*Available water capacity:* About 8.9 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—4e

Range site number and name—none assigned

*Typical profile:*

Ap—0 to 6 inches; loam

Bt—6 to 11 inches; clay loam

2Bt—11 to 34 inches; silty clay

2Btk—34 to 58 inches; silty clay

2Cr—58 to 72 inches; bedrock

*Location of representative profile:* Oklahoma County, Oklahoma; about 1,700 feet east and 1,420 feet north of the southwest corner of sec. 35, T. 12 N., R. 1 E.

### **Management**

*Major uses:* Urban land

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **TelB—Teller loam, 1 to 3 percent slopes**

### **Map Unit Setting**

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### **Major Component Description**

#### **Teller and similar soils**

*Extent of the component in the map unit:* 96 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Tread

*Parent material:* Fine-loamy alluvium

*Slope range:* 1 to 3 percent

*Runoff:* Low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 10.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 9 inches; loam

BA—9 to 15 inches; loam

Bt1—15 to 31 inches; clay loam

Bt2—31 to 44 inches; sandy clay loam

Bt3—44 to 55 inches; fine sandy loam

BC—55 to 80 inches; fine sandy loam

*Location of representative profile:* About 1,900 feet west and 170 feet north of the southeast corner of sec. 19, T. 19 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **TelC2—Teller loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,100 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Teller and similar soils**

*Extent of the component in the map unit:* 96 percent

*Geomorphic setting:* Stream terrace in a valley

*Position on landform:* Tread

*Parent material:* Fine-loamy alluvium

*Slope range:* 3 to 5 percent

*Runoff:* Very low

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderate

*Slowest permeability class within a depth of 60 inches:* Moderate

*Drainage class:* Well drained

*Available water capacity:* About 10.2 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 4 inches; loam

BA—4 to 25 inches; loam

Bt1—25 to 44 inches; clay loam

Bt2—44 to 59 inches; sandy clay loam

Bt3—59 to 80 inches; sandy clay loam

*Location of representative profile:* About 850 feet west and 400 feet north of the southeast corner of sec. 6, T. 16 N., R. 2 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **TriA—Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded**

### ***Map Unit Setting***

*Major land resource area:* 84A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Tribbey and similar soils**

*Extent of the component in the map unit:* 90 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* High

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Somewhat poorly drained

*Available water capacity:* About 8.4 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 3.5 feet

*Flooding:* Frequent

*Ponding:* None

*Interpretive groups:*

Land capability classification—5w

Range site number and name—084AY095OK, Subirrigated

*Typical profile:*

A—0 to 6 inches; fine sandy loam

C1—6 to 45 inches; fine sandy loam

C2—45 to 80 inches; stratified loamy fine sand to loam

*Location of representative profile:* About 1,500 feet east and 2,450 feet north of the southwest corner of sec. 19, T. 15 N., R. 1 W.

***Management***

*Major uses:* Rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**URB—Urban land*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

***Major Component Description*****Urban land**

*Extent of the component in the map unit:* 100 percent

*Geomorphic setting:* Hill on uplands

*Parent material:* Mine spoil or earthy fill derived from sandstone and shale

*Slope range:* 1 to 5 percent

*Runoff:* Very high

*Interpretive groups:*

Land capability classification—8s

Range site number and name—none assigned

*Definition:*

Urban land mostly consists of residential and business areas, paved roads, streets, and parking areas.

*Location of a representative area:* About 50 feet east and 2,100 feet south of the northwest corner of sec. 8, T. 16 N., R. 2 W.

***Management***

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**W—Water*****Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Water**

*Extent of the component in the map unit:* 100 percent

*Interpretive groups:*

Land capability classification—none assigned

Range site number and name—none assigned

*Definition:*

This map unit includes ponds, lakes, rivers, and other bodies of water.

*Location of a representative area:* About 2,100 feet east and 1,000 feet south of the northwest corner of sec. 11, T. 16 N., R. 2 W.

### ***Management***

*Major uses:* Recreation

For general and detailed information about managing this map unit, see the sections "Use and Management of the Soils" and "Soil Properties."

## **YaaA—Yahola loam, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Yahola and similar soils**

*Extent of the component in the map unit:* 87 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 9.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—2w

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

Ap—0 to 7 inches; loam

A1—7 to 14 inches; loam

A2—14 to 34 inches; loam

C1—34 to 46 inches; stratified loamy fine sand to loam

C2—46 to 80 inches; stratified loamy fine sand to loam

*Location of representative profile:* About 2,300 feet east and 4,100 feet north of the southwest corner of sec. 2, T. 16 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **YahA—Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 850 to 1,050 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Yahola and similar soils**

*Extent of the component in the map unit:* 87 percent

*Geomorphic setting:* Flood plain in a valley

*Parent material:* Coarse-loamy alluvium

*Slope range:* 0 to 1 percent

*Runoff:* Negligible

*Soil depth:* More than 60 inches

*Slowest permeability class of the soil:* Moderately rapid

*Slowest permeability class within a depth of 60 inches:* Moderately rapid

*Drainage class:* Well drained

*Available water capacity:* About 9.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* Occasional

*Ponding:* None

*Interpretive groups:*

Land capability classification—2w

Range site number and name—080AY050OK, Loamy Bottomland

*Typical profile:*

Ap—0 to 6 inches; fine sandy loam

C1—6 to 34 inches; loam

C2—34 to 80 inches; stratified loamy fine sand to loam

*Location of representative profile:* About 1,700 feet east and 3,100 feet north of the southwest corner of sec. 2, T. 16 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”



## **ZaHC—Zaneis-Huska complex, 3 to 5 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Zaneis and similar soils**

*Extent of the component in the map unit:* 55 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Fine-loamy residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Low

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 8.0 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 12 inches; fine sandy loam

Bt1—12 to 25 inches; sandy clay loam

Bt2—25 to 32 inches; sandy clay loam

BC—32 to 52 inches; sandy clay loam

Cr—52 to 60 inches; bedrock

*Location of representative profile:* About 1,450 feet west and 850 feet south of the northeast corner of sec. 32, T. 17 N., R. 1 W.

#### **Huska and similar soils**

*Extent of the component in the map unit:* 25 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Shoulder and backslope

*Parent material:* Clayey residuum weathered from sandstone and shale

*Slope range:* 3 to 5 percent

*Runoff:* Very high

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Very slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Moderately well drained

*Available water capacity:* About 5.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Salt affected:* Saline within a depth of 30 inches

*Sodium affected:* Sodic within a depth of 30 inches

*Interpretive groups:*

Land capability classification—4s

Range site number and name—080AY091OK, Slickspot

*Typical profile:*

Ap—0 to 5 inches; loam

B<sub>tn</sub>—5 to 13 inches; clay

B<sub>t1</sub>—13 to 20 inches; clay

B<sub>t2</sub>—20 to 39 inches; clay loam

B<sub>t3</sub>—39 to 59 inches; clay loam

Cr—59 to 67 inches; bedrock

*Location of representative profile:* About 1,875 feet west and 850 feet south of the northeast corner of sec. 32, T. 17 N., R. 1 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **ZanB—Zaneis loam, 1 to 3 percent slopes**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Zaneis and similar soils**

*Extent of the component in the map unit:* 87 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Summit and backslope

*Parent material:* Fine-loamy residuum weathered from sandstone

*Slope range:* 1 to 3 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 7.3 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—2e

Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 10 inches; loam  
Bt1—10 to 17 inches; loam  
Bt2—17 to 28 inches; clay loam  
Bt3—28 to 38 inches; clay loam  
Bt4—38 to 44 inches; sandy clay loam  
Cr—44 to 54 inches; bedrock

*Location of representative profile:* About 100 feet east and 100 feet south of the northwest corner of sec. 35, T. 19 N., R. 2 W.

**Management**

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

**ZanC—Zaneis loam, 3 to 5 percent slopes****Map Unit Setting**

*Major land resource area:* 80A  
*Elevation range:* 900 to 1,200 feet  
*Mean annual precipitation:* 32 to 36 inches  
*Mean annual air temperature:* 60 to 61 degrees F  
*Frost-free period:* 200 to 210 days

**Major Component Description****Zaneis and similar soils**

*Extent of the component in the map unit:* 87 percent  
*Geomorphic setting:* Hill on uplands  
*Position on landform:* Summit and backslope  
*Parent material:* Fine-loamy residuum weathered from sandstone  
*Slope range:* 3 to 5 percent  
*Runoff:* Low  
*Depth to bedrock (paralithic):* 40 to 60 inches  
*Slowest permeability class of the soil:* Moderately slow  
*Slowest permeability class within a depth of 60 inches:* Impermeable  
*Drainage class:* Well drained  
*Available water capacity:* About 7.7 inches  
*Depth to the top of the seasonal high water table:* More than 6 feet  
*Flooding:* None  
*Ponding:* None

*Interpretive groups:*

Land capability classification—3e  
Range site number and name—080AY056OK, Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; loam  
BA—8 to 14 inches; loam  
Bt1—14 to 25 inches; loam  
Bt2—25 to 31 inches; sandy clay loam  
Bt3—31 to 47 inches; sandy clay loam  
Cr—47 to 54 inches; bedrock

*Location of representative profile:* About 2,100 feet west and 100 feet south of the northeast corner of sec. 27, T. 19 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## **ZanC2—Zaneis loam, 3 to 5 percent slopes, eroded**

### ***Map Unit Setting***

*Major land resource area:* 80A

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 32 to 36 inches

*Mean annual air temperature:* 60 to 61 degrees F

*Frost-free period:* 200 to 210 days

### ***Major Component Description***

#### **Zaneis and similar soils**

*Extent of the component in the map unit:* 87 percent

*Geomorphic setting:* Hill on uplands

*Position on landform:* Backslope

*Parent material:* Fine-loamy residuum weathered from sandstone

*Slope range:* 3 to 5 percent

*Runoff:* Medium

*Depth to bedrock (paralithic):* 40 to 60 inches

*Slowest permeability class of the soil:* Moderately slow

*Slowest permeability class within a depth of 60 inches:* Impermeable

*Drainage class:* Well drained

*Available water capacity:* About 9.1 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Flooding:* None

*Ponding:* None

*Interpretive groups:*

Land capability classification—3e

Range site number and name—080AY856OK, Reseeded Loamy Prairie

*Typical profile:*

Ap—0 to 8 inches; loam

Bt1—8 to 15 inches; loam

Bt2—15 to 26 inches; sandy clay loam

Bt3—26 to 43 inches; sandy clay loam

Bt4—43 to 56 inches; sandy clay loam

Cr—56 to 60 inches; bedrock

*Location of representative profile:* About 475 feet east and 150 feet south of the northwest corner of sec. 24, T. 16 N., R. 3 W.

### ***Management***

*Major uses:* Cropland, hayland, pastureland, and rangeland

For general and detailed information about managing this map unit, see the sections “Use and Management of the Soils” and “Soil Properties.”

## Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

### Agronomy

General management concerns affecting the production of crops and hay and pasture plants are identified in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider specific information available from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, woodland, or engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit (11). These levels indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

*Capability classes*, the broadest groups, are designated by Arabic numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide guidance on the use of these soils as cropland.

Areas in class 8 are generally not suitable for crops, pasture, rangeland, or woodland. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

*Capability subclasses* identify the dominant kind of limitation in the class. They are designated by adding a small letter, e, w, s, or c, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by w, s, or c because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the table "Land Capability and Yields per Acre of Crops and Pasture" and in the "Detailed Soil Map Units" section.

# Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
AspA: Ashport-----	2w	5.00	50.00	8.50	6.50	30.00	7.00	---	35.00
AstA: Ashport-----	5w	---	---	8.50	6.50	---	7.00	---	---
Beta: Bethany-----	1	3.50	50.00	5.00	6.00	---	5.50	---	40.00
BetB: Bethany-----	2e	3.00	45.00	4.50	5.50	---	5.00	---	35.00
BocA: Bocox-----	5w	---	---	3.00	2.00	---	3.00	---	---
Bt1A: Bathel-----	3w	2.50	35.00	6.00	3.00	---	7.00	---	25.00
CaaA: Canadian-----	1	4.00	55.00	8.50	6.50	---	7.00	---	40.00
CA1D: Coyle-----	3e	1.50	---	4.50	4.50	---	3.00	4.50	---
Ashport-----	5w	---	---	8.50	6.50	---	7.00	---	---
Ironmound-----	4e	---	---	2.00	2.00	---	---	---	---
Co1C2: Coyle-----	3e	1.00	35.00	4.00	4.00	---	3.00	4.00	15.00
Ironmound-----	3e	---	20.00	2.00	2.00	---	---	---	12.00
CoUB: Coyle-----	3s	---	---	---	---	---	---	---	---
Urban land-----	8s	---	---	---	---	---	---	---	---
CoUC: Coyle-----	3e	---	---	---	---	---	---	---	---
Urban land-----	8s	---	---	---	---	---	---	---	---



Land Capability and Yields per Acre of Crops and Pasture-Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		Tons	Bu	AUM	AUM	Bu	AUM	AUM	Bu
CoyB: Coyle-----	2e	2.00	45.00	5.00	5.00	---	3.50	5.00	25.00
CoyC2: Coyle-----	3e	1.00	35.00	4.00	4.00	---	2.50	4.00	15.00
CoZC3: Coyle-----	6e	---	---	2.50	2.50	---	2.00	2.50	---
Zaneis-----	6e	---	---	3.00	3.00	---	2.00	3.00	---
DAM: Dam-----	8s	---	---	---	---	---	---	---	---
DerB: Derby-----	3s	1.50	25.00	4.00	3.00	---	---	4.00	20.00
DerD: Derby-----	4e	1.50	25.00	3.50	2.50	---	---	4.50	15.00
DerE: Derby-----	6e	---	---	3.50	2.50	---	---	4.00	---
DiRG: Darsil-----	7e	---	---	---	---	---	---	---	---
Rock outcrop-----	8s	---	---	---	---	---	---	---	---
DouB: Dougherty-----	3e	2.50	30.00	4.00	3.00	---	---	4.50	25.00
DouD: Dougherty-----	4e	2.00	25.00	3.50	---	---	---	4.00	20.00
DUM: Dumps-----	8s	---	---	---	---	---	---	---	---
EasA: Easpur-----	2w	5.00	50.00	8.50	6.50	30.00	2.00	---	35.00
GadA: Gaddy-----	3s	3.00	30.00	4.00	3.00	---	---	---	20.00
GaGA: Gaddy-----	5w	---	---	4.00	3.00	---	7.00	---	---
Gracemore-----	5w	---	---	7.00	6.50	---	---	---	---

Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		Tons	Bu	AUM	AUM	Bu	AUM	AUM	Bu
GMGE4: Grainola-----	6e	---	---	2.00	3.00	---	---	---	---
Masham-----	6e	---	---	2.00	2.50	---	---	---	---
Gullied land-----	8e	---	---	---	---	---	---	---	---
GMWG: Grainola-----	6e	---	---	2.50	2.00	---	---	---	---
Masham-----	7e	---	---	---	---	---	---	---	---
Lucien-----	6e	---	---	---	---	---	---	2.00	---
GohC: Goodnight-----	3e	1.50	25.00	4.00	3.00	---	---	4.50	15.00
GohE: Goodnight-----	6e	---	---	3.50	2.50	---	---	4.00	---
GooE: Goodnight-----	6e	---	---	2.50	2.00	---	---	---	---
Goog: Goodnight-----	7e	---	---	---	---	---	---	---	---
Grac: Grainola-----	4e	---	30.00	3.50	4.00	---	2.00	---	15.00
Grad2: Grainola-----	6e	---	---	2.50	3.00	---	1.00	---	---
GrHC: Grant-----	3e	2.00	40.00	5.00	4.50	---	4.50	5.00	25.00
Huska-----	4s	---	25.00	3.00	2.50	---	1.50	---	15.00
GrIE: Grainola-----	6e	2.50	---	---	---	---	---	---	---
Ironmound-----	6e	2.00	---	---	---	---	---	---	---
GrLE: Grainola-----	6e	---	---	2.50	3.00	---	2.00	---	---
Lucien-----	6e	---	---	2.00	2.50	---	2.50	2.00	---

Land Capability and Yields per Acre of Crops and Pasture-Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		Tons	Bu	AUM	AUM	Bu	AUM	AUM	Bu
HaGD4: Harrah-----	6e	---	---	2.00	2.00	---	2.00	2.50	---
Gullied land-----	8e	---	---	---	---	---	---	---	---
HarC: Harrah-----	3e	2.50	40.00	4.00	4.00	---	3.50	4.50	25.00
HarC2: Harrah-----	4e	2.00	35.00	3.50	3.50	---	3.00	4.00	20.00
HarG: Harrah-----	7e	---	---	---	---	---	---	---	---
HawB: Hawley-----	3e	3.50	50.00	8.00	7.00	---	7.00	---	30.00
ICGD3: Ironmound-----	7e	---	---	---	---	---	1.50	---	---
Coyle-----	6e	---	---	2.50	2.00	---	1.50	2.50	---
Grainola-----	6e	---	---	2.00	2.50	---	---	---	---
IrCE: Ironmound-----	6e	---	---	2.00	2.00	---	---	---	---
Coyle-----	6e	---	---	2.50	2.50	---	2.00	2.50	---
IroC2: Ironmound-----	3e	---	---	2.00	2.00	---	1.50	---	12.00
KgfB: Kingfisher-----	2e	1.50	40.00	5.00	5.50	---	4.50	---	30.00
KinC2: Kingfisher-----	3e	1.00	30.00	4.00	4.50	---	3.50	---	20.00
KonB: Konawa-----	3e	2.50	40.00	4.00	3.50	---	---	4.50	25.00
KonD2: Konawa-----	4e	1.00	25.00	3.00	2.50	---	---	3.50	15.00
KrdA: Kirkland-----	2s	2.50	40.00	4.00	5.50	---	3.50	4.00	35.00

Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		<u>Tons</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>
KrkB: Kirkland-----	3e	2.00	35.00	4.00	5.00	---	3.50	4.00	30.00
LarA, LawA: Lawrie-----	1	5.50	70.00	8.50	6.50	30.00	7.00	---	40.00
LerA: Lebron-----	6w	---	30.00	5.00	2.50	---	7.00	---	15.00
LitB: Littleaxe-----	2e	3.00	50.00	5.00	4.50	---	4.50	5.50	30.00
LitC2: Littleaxe-----	3e	2.50	40.00	4.50	4.00	---	4.00	5.00	20.00
M-W. Miscellaneous water									
MaID: Masham-----	6e	---	---	2.00	2.50	---	---	---	---
Ironmound-----	6e	---	---	2.00	2.00	---	---	---	---
MaIG: Masham-----	7e	---	---	---	---	---	---	---	---
Ironmound-----	7e	---	---	---	---	---	---	---	---
MinB: Minco-----	2e	3.00	45.00	5.50	6.00	---	5.00	5.50	30.00
MinC: Minco-----	3e	2.50	40.00	5.00	5.50	---	4.50	5.00	30.00
MinD: Minco-----	4e	1.50	35.00	4.50	4.00	---	4.00	4.50	25.00
MinF: Minco-----	6e	---	---	4.00	3.50	---	3.50	4.00	---
MlIA: Miller-----	3w	3.50	60.00	6.50	6.50	---	6.50	---	35.00
MulC: Mulhall-----	3e	2.50	35.00	5.50	5.50	---	5.00	---	30.00

Land Capability and Yields per Acre of Crops and Pasture-Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		Tons	Bu	AUM	AUM	Bu	AUM	AUM	Bu
MulC2: Mulhall-----	3e	1.50	30.00	5.00	5.00	---	4.50	---	25.00
NavA: Navina-----	1	3.50	55.00	5.50	6.00	---	5.00	5.50	35.00
NavB: Navina-----	2e	3.00	50.00	5.50	6.00	---	5.00	5.50	30.00
NeGD4: Newalla-----	3e	---	---	5.00	4.00	---	3.50	5.50	---
Gullied land-----	8e	---	---	---	---	---	---	---	---
NewB: Newalla-----	3s	1.50	45.00	5.00	5.00	---	3.50	5.50	25.00
NorA: Norge-----	1	3.50	55.00	5.50	6.00	---	5.00	5.50	35.00
NorB: Norge-----	2e	3.00	50.00	5.50	6.00	---	5.00	5.50	30.00
NorC2: Norge-----	3e	1.50	35.00	4.50	5.00	---	4.00	4.50	25.00
OWHD: Oil waste land-----	8s	---	---	---	2.00	---	1.50	---	---
Huska-----	4s	---	---	3.00	---	---	---	---	---
PieB: Piedmont-----	2e	1.50	30.00	4.00	4.50	---	3.50	---	25.00
PieC2: Piedmont-----	3e	---	25.00	3.50	4.00	---	3.00	---	15.00
PIT: Pits-----	8s	---	---	---	---	---	---	---	---
PukA: Pulaski-----	5w	---	---	7.00	6.00	---	6.00	---	---
Pula: Pulaski-----	2w	3.50	50.00	7.00	6.00	---	6.00	---	30.00

Land Capability and Yields per Acre of Crops and Pasture-Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		<u>Tons</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>
RenB: Renfrow-----	2e	2.00	35.00	3.00	5.00	---	2.50	---	30.00
RenC: Renfrow-----	3e	1.50	30.00	2.50	4.50	---	2.00	---	25.00
RewC2: Renfrow-----	3e	1.50	20.00	2.50	4.00	---	2.00	---	25.00
RinB: Renthin-----	2e	2.00	35.00	3.00	5.00	---	2.50	---	30.00
RnnC2: Renthin-----	3e	1.50	20.00	2.50	4.00	---	2.00	---	---
SDGD4: Stephenville-----	4e	---	---	3.00	2.00	---	2.00	4.00	25.00
Darsil-----	6e	---	---	1.50	1.50	---	1.50	2.00	---
Gullied land-----	8e	---	---	---	---	---	---	---	---
SDND: Stephenville-----	4e	---	---	3.50	3.50	---	2.00	4.00	---
Darsil-----	6e	---	---	2.00	2.00	---	1.50	2.50	---
Newalla-----	4e	---	---	4.50	4.50	---	3.00	5.00	---
SDND2: Stephenville-----	4e	---	---	3.00	3.00	---	2.00	4.00	---
Darsil-----	6e	---	---	1.50	1.50	---	1.50	2.00	---
Newalla-----	6e	---	---	4.00	4.00	---	2.50	4.50	---
Slab: Slaughterville-----	2e	3.00	45.00	5.00	4.50	---	4.00	5.50	30.00
Slad: Slaughterville-----	4e	2.00	35.00	4.00	3.50	---	3.50	4.50	20.00
Slaf: Slaughterville-----	6e	---	---	3.50	3.00	---	2.00	4.00	---

Land Capability and Yields per Acre of Crops and Pasture-Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		Tons	Bu	AUM	AUM	Bu	AUM	AUM	Bu
StDC: Stephenville-----	3e	1.50	35.00	4.00	4.00	15.00	2.50	4.50	25.00
Darsil-----	4e	---	20.00	2.50	2.50	---	2.00	3.00	12.00
StDC2: Stephenville-----	3e	1.00	30.00	3.50	3.50	15.00	2.00	4.50	20.00
Darsil-----	4e	---	20.00	2.00	2.00	---	1.50	2.50	12.00
StDE: Stephenville-----	6e	---	---	3.00	3.00	---	2.00	3.50	---
Darsil-----	6e	---	---	2.00	2.00	---	---	2.50	---
SteB: Stephenville-----	2e	2.50	45.00	4.50	4.50	20.00	3.00	5.00	30.00
SteC2: Stephenville-----	3e	1.50	30.00	3.50	3.50	15.00	2.00	4.50	20.00
SUND: Stephenville-----	4e	---	---	---	---	---	---	---	---
Urban land-----	8s	---	---	---	---	---	---	---	---
Newalla-----	4e	---	---	---	---	---	---	---	---
TelB: Teller-----	2e	3.00	50.00	5.50	6.00	---	6.00	5.50	35.00
TelC2: Teller-----	3e	1.50	35.00	4.50	5.00	---	4.50	4.50	20.00
TriA: Tribbey-----	5w	---	---	6.00	3.00	---	7.00	---	---
URB: Urban land-----	8s	---	---	---	---	---	---	---	---
W. Water									
Yaaa, Yaha: Yahola-----	2w	3.50	50.00	7.00	5.50	---	7.00	---	30.00



Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability	Alfalfa hay	Grain sorghum	Improved bermudagrass	Introduced bluestem	Soybeans	Tall wheatgrass	Weeping lovegrass	Wheat
		<u>Tons</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>	<u>AUM</u>	<u>AUM</u>	<u>Bu</u>
ZaHC: Zaneis-----	3e	1.50	35.00	5.00	5.50	---	4.00	5.00	20.00
Huska-----	4s	---	25.00	3.00	2.50	---	1.50	---	15.00
ZanB: Zaneis-----	2e	2.50	40.00	5.50	6.00	---	5.00	5.50	30.00
ZanC: Zaneis-----	3e	1.50	35.00	5.00	5.50	---	4.50	5.00	25.00
ZanC2: Zaneis-----	3e	1.00	30.00	4.50	3.00	---	4.00	4.50	20.00

## Estimated Yields of Crops and Pasture

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the table “Land Capability and Yields per Acre of Crops and Pasture.” In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small.

Under good pasture management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

A pasture program is needed to provide the desired amount of forage during each month of the year. A study of the growth habits of the different plants is necessary to ensure adequate forage during each month. The months that various kinds of forage plants grow are indicated in figure 16, which is in the “Range” section. The percent growth that can be safely grazed each month without substantially reducing the total yield for each kind of plant is illustrated.

Yield estimates are often indicated in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in the table.

## Cropland Limitations and Hazards

The management concerns affecting the use of the detailed map units in the survey area for crops are shown in the table “Cropland Limitations and Hazards.” The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility and tilth.

*Conserving moisture* primarily involves reducing the evaporation and runoff rates and increasing the rate of water infiltration. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion*. Conservation tillage, stripcropping, field windbreaks, tall grass barriers,

contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, soil tilth, pest and weed control, and timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels, flooding, depth to bedrock, ponding, gullies, and lack of timely precipitation*.

Additional limitations and hazards are as follows:

*Areas of rock outcrop and oil waste land.*—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

*Excessive permeability.*—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

*Potential for ground-water pollution.*—This is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

*Lime content, limited available water capacity, poor tilth, restricted permeability, and surface crusting.*—The adverse effects of these limitations can be reduced by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer on soils that have a high content of lime.

*Surface rock fragments.*—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

*Slope.*—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

*Surface stones.*—Stones or boulders on the surface can hinder normal tillage unless they are removed.

*Salt and sodium content.*—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

### **Criteria for Limitations and Hazards**

Following are explanations of the criteria used to determine the limitations or hazards.

*Areas of rock outcrop.*—Rock outcrop is a named component of the map unit.

*Areas of rubble land.*—Rubble land is a named component of the map unit.

*Areas of oil waste land.*—Oil waste land is a named component of the map unit.

*Channeled.*—The word “channeled” is included in the name of the map unit.

*Depth to bedrock.*—Bedrock is within a depth of 40 inches.

*Water erosion.*—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

*Excessive permeability.*—The upper limit of the permeability range is 6 inches or more within the soil profile.

*Flooding.*—The component of the map unit is occasionally flooded or frequently flooded.

*Gullied.*—The word “gullied” is included in the name of the map unit.

*Lime content.*—The surface layer has more than 5 percent calcium carbonate equivalent or has a wind erodibility group of 4L.

*Limited available water capacity.*—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

*Ponding.*—A ponding duration is assigned to the component of the map unit.

*Potential for ground-water pollution.*—The soil has a water table within a depth of 4 feet or bedrock within 40 inches of the surface, or permeability is more than 2 inches per hour within the soil profile.

*Poor tilth.*—The component of the map unit has more than 35 percent clay in the surface layer.

*Restricted permeability.*—Permeability is 0.06 inch per hour or less within the soil profile.

*Salt content.*—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

*Slope.*—The upper slope limit of the component of the map unit is more than 8 percent.

*Sodium content.*—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

*Soil blowing.*—The wind erodibility index is equal to or greater than 8.

*Surface rock fragments.*—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery.

*Surface crusting.*—The organic matter content is less than 2 percent in the surface layer.

*Surface stones.*—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the map unit is a stony or bouldery phase.

*Water table.*—The component of the map unit has a water table within a depth of 3 feet.

## Cropland Limitations and Hazards

(See text for a description and criteria of the limitations and hazards listed in this table)

Map symbol and component name	Cropland limitations and hazards
AspA, AstA: Ashport-----	Flooding
BetA, BetB: Bethany-----	None
BocA: Bocox-----	Ponding Excessive permeability Potential for ground-water pollution Water table
Bt1A: Bathel-----	Ponding Excessive permeability Potential for ground-water pollution Water table
CaaA: Canadian-----	Excessive permeability Potential for ground-water pollution
CAID: Coyle-----	Depth to bedrock Restricted permeability
Ashport-----	Flooding
Ironmound-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity
CoIC2: Coyle-----	Depth to bedrock Restricted permeability
Ironmound-----	Depth to bedrock Restricted permeability Limited available water capacity
CoUB: Coyle-----	Depth to bedrock Restricted permeability Limited available water capacity
Urban land-----	Non-soil material
CoUC: Coyle-----	Depth to bedrock Restricted permeability Limited available water capacity
Urban land-----	Non-soil material
CoyB, CoyC2: Coyle-----	Depth to bedrock Restricted permeability Limited available water capacity

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
CoZC3: Coyle-----	Depth to bedrock Restricted permeability Limited available water capacity
Zaneis-----	Restricted permeability
DAM: Dam-----	Non-soil material
DerB, DerD: Derby-----	Excessive permeability Potential for ground-water pollution
DerE: Derby-----	Water erosion Excessive permeability Potential for ground-water pollution Slope
DiRG: Darsil-----	Soil blowing Water erosion Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity Slope
Rock outcrop-----	Non-soil material
DouB, DouD: Dougherty-----	Potential for ground-water pollution
DUM: Dumps-----	Non-soil material
EasA: Easpur-----	Flooding
GadA: Gaddy-----	Flooding Excessive permeability Potential for ground-water pollution
GaGA: Gaddy-----	Flooding Excessive permeability Potential for ground-water pollution Surface crusting
Gracemore-----	Flooding Excessive permeability Potential for ground-water pollution Water table Surface crusting
GMGE4: Grainola-----	Water erosion Depth to bedrock Restricted permeability Slope Surface crusting Poor tilth

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
GMGE4: Masham-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Surface crusting Lime content Poor tilth
Gullied land-----	Non-soil material
GMLG: Grainola-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Poor tilth
Masham-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Surface crusting Lime content Poor tilth
Lucien-----	Water erosion Depth to bedrock Restricted permeability Potential for ground-water pollution Limited available water capacity Slope
GohC: Goodnight-----	Excessive permeability Potential for ground-water pollution
GohE: Goodnight-----	Water erosion Excessive permeability Potential for ground-water pollution Slope
GooE, GooG: Goodnight-----	Soil blowing Water erosion Excessive permeability Potential for ground-water pollution Slope
GraC: Grainola-----	Depth to bedrock Restricted permeability Surface crusting Poor tilth



## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
GraD2: Grainola-----	Water erosion Depth to bedrock Restricted permeability Surface crusting Poor tilth
GrHC: Grant-----	Restricted permeability
Huska-----	Water erosion Restricted permeability Sodium content Salt content Limited available water capacity Surface crusting Poor tilth
GrIE: Grainola-----	Water erosion Depth to bedrock Restricted permeability Slope Surface crusting
Ironmound-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope
GrLE: Grainola-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Surface crusting
Lucien-----	Water erosion Depth to bedrock Restricted permeability Potential for ground-water pollution Limited available water capacity Slope
HaGD4: Harrah-----	Potential for ground-water pollution
Gullied land-----	Non-soil material
HarC, HarC2: Harrah-----	Potential for ground-water pollution
HarG: Harrah-----	Water erosion Potential for ground-water pollution Slope
HawB: Hawley-----	Excessive permeability Potential for ground-water pollution

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
ICGD3: Ironmound-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Potential for ground-water pollution Limited available water capacity
Coyle-----	Water erosion Depth to bedrock Restricted permeability
Grainola-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Surface crusting Poor tilth
IrCE: Ironmound-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Potential for ground-water pollution Limited available water capacity Slope
Coyle-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope
IroC2: Ironmound-----	Depth to bedrock Restricted permeability Limited available water capacity
KgfB: Kingfisher-----	Depth to bedrock Restricted permeability
KinC2: Kingfisher-----	Depth to bedrock Restricted permeability Limited available water capacity
KonB, KonD2: Konawa-----	Potential for ground-water pollution
KrdA: Kirkland-----	Restricted permeability Surface crusting
KrkB: Kirkland-----	Restricted permeability
LarA: Lawrie-----	Flooding
LawA: Lawrie-----	None

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
LerA: Lebron-----	Flooding Ponding Excessive permeability Restricted permeability Potential for ground-water pollution Water table Poor tilth
LitB, LitC2: Littleaxe-----	Potential for ground-water pollution
M-W: Miscellaneous water-----	Non-soil material
MaID, MaIG: Masham-----	Soil blowing Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Surface crusting Lime content Poor tilth
Ironmound-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope
MinB, MinC: Minco-----	None
MinD: Minco-----	Water erosion
MinF: Minco-----	Water erosion Slope
M11A: Miller-----	Flooding Restricted permeability Poor tilth
MulC, MulC2: Mulhall-----	None
NavA, NavB: Navina-----	None
NeGD4: Newalla-----	Water erosion Restricted permeability
Gullied land-----	Non-soil material
NewB: Newalla-----	Restricted permeability
NorA, NorB, NorC2: Norge-----	None

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
OWHD: Oil waste land-----	Non-soil material
Huska-----	Restricted permeability Sodium content Salt content Surface crusting
PieB: Piedmont-----	Depth to bedrock Restricted permeability
PieC2: Piedmont-----	Water erosion Depth to bedrock Restricted permeability Limited available water capacity
PIT: Pits-----	Non-soil material
PukA, Pula: Pulaski-----	Flooding Potential for ground-water pollution Surface crusting
RenB: Renfrow-----	Restricted permeability
RenC, RewC2: Renfrow-----	Water erosion Restricted permeability
RinB: Renthin-----	Restricted permeability
RnnC2: Renthin-----	Water erosion Restricted permeability
SDGD4: Stephenville-----	Depth to bedrock Potential for ground-water pollution Limited available water capacity Surface crusting
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity
Gullied land-----	Non-soil material
SDND: Stephenville-----	Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity Surface crusting

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
SDND:	
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity
Newalla-----	Water erosion Restricted permeability
SDND2:	
Stephenville-----	Depth to bedrock Potential for ground-water pollution Limited available water capacity Surface crusting
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity
Newalla-----	Water erosion Restricted permeability
SlaB, SlaD:	
Slaughterville-----	Excessive permeability Potential for ground-water pollution
SlaF:	
Slaughterville-----	Water erosion Excessive permeability Potential for ground-water pollution Slope
StDC:	
Stephenville-----	Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity Surface crusting
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity
StDC2:	
Stephenville-----	Depth to bedrock Potential for ground-water pollution Surface crusting
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
StDE: Stephenville-----	Water erosion Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity Slope Surface crusting
Darsil-----	Soil blowing Depth to bedrock Excessive permeability Potential for ground-water pollution Limited available water capacity
SteB: Stephenville-----	Depth to bedrock Excessive permeability Potential for ground-water pollution Surface crusting
SteC2: Stephenville-----	Depth to bedrock Potential for ground-water pollution Limited available water capacity Surface crusting
SUND: Stephenville-----	Depth to bedrock Potential for ground-water pollution Limited available water capacity Surface crusting
Urban land-----	Non-soil material
Newalla-----	Water erosion Restricted permeability
TelB, TelC2: Teller-----	Potential for ground-water pollution
TriA: Tribbey-----	Flooding Potential for ground-water pollution Water table Surface crusting
URB: Urban land-----	Non-soil material
W: Water-----	Non-soil material
YaaA, YahA: Yahola-----	Flooding Potential for ground-water pollution Surface crusting

## Cropland Limitations and Hazards—Continued

Map symbol and component name	Cropland limitations and hazards
ZaHC: Zaneis-----	Restricted permeability Potential for ground-water pollution
Huska-----	Water erosion Restricted permeability Sodium content Salt content Limited available water capacity Surface crusting Poor tilth
ZanB, ZanC, ZanC2: Zaneis-----	Restricted permeability



## Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment (7).

Prime farmland soils may presently be used as cropland, pasture, rangeland, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range from 0 to 8 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage measures, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 100,000 acres in the survey area, or nearly 21 percent of the total acreage, meets the requirements for prime farmland. The map units in the survey area that meet the requirements for prime farmland are listed in the table "Prime Farmland." The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

## Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded
BetA	Bethany silt loam, 0 to 1 percent slopes
BetB	Bethany silt loam, 1 to 3 percent slopes
Bt1A	Bathel loamy sand, 0 to 1 percent slopes
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded
CoyB	Coyle loam, 1 to 3 percent slopes
EasA	Easpor loam, 0 to 1 percent slopes, occasionally flooded
GraC	Grainola silty clay loam, 3 to 5 percent slopes
HarC	Harrah fine sandy loam, 3 to 5 percent slopes
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded
HawB	Hawley loamy fine sand, 0 to 3 percent slopes, rarely flooded
KgfB	Kingfisher silt loam, 1 to 3 percent slopes
KrdA	Kirkland silt loam, 0 to 1 percent slopes
KrkB	Kirkland silty clay loam, 1 to 3 percent slopes
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes
MinB	Minco very fine sandy loam, 1 to 3 percent slopes
MinC	Minco very fine sandy loam, 3 to 5 percent slopes
M11A	Miller silty clay, 0 to 1 percent slopes, occasionally flooded
MulC	Mulhall loam, 3 to 5 percent slopes
MulC2	Mulhall loam, 3 to 5 percent slopes, eroded
NavA	Navina fine sandy loam, 0 to 1 percent slopes
NavB	Navina fine sandy loam, 1 to 3 percent slopes
NewB	Newalla fine sandy loam, 1 to 3 percent slopes
NorA	Norge silt loam, 0 to 1 percent slopes
NorB	Norge silt loam, 1 to 3 percent slopes
NorC2	Norge silt loam, 3 to 5 percent slopes, eroded
PieB	Piedmont silty clay loam, 1 to 3 percent slopes
PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded
RenB	Renfrow silt loam, 1 to 3 percent slopes
RinB	Renthin silt loam, 1 to 3 percent slopes
RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded
SlaB	Slaughterville fine sandy loam, 1 to 3 percent slopes
StDC	Stephenville-Darsil complex, 1 to 5 percent slopes
SteB	Stephenville fine sandy loam, 1 to 3 percent slopes
SteC2	Stephenville fine sandy loam, 3 to 5 percent slopes, eroded
TelB	Teller loam, 1 to 3 percent slopes
TelC2	Teller loam, 3 to 5 percent slopes, eroded
YaaA	Yahola loam, 0 to 1 percent slopes, occasionally flooded
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded
ZanB	Zaneis loam, 1 to 3 percent slopes
ZanC	Zaneis loam, 3 to 5 percent slopes
ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded

## Range

Mark Moseley, Range Conservationist, Natural Resources Conservation Service, helped prepare this section.

Range, grazed forestland, and native pasture provide forage for livestock in the survey area.

*Range* is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grass-like plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannahs, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

*Grazed forestland* is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

*Native pasture* is defined as land on which the potential (climax) vegetation is forest but which is used and managed primarily for the production of native forage plants. Native pasture includes cutover forestland and forestland that has been cleared and is managed for native or naturalized forage plants.

The table "Rangeland Productivity and Characteristic Plant Communities" shows, for each soil, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species.

Rangeland makes up about 40 percent of Logan County. It is mainly on gently sloping to steep side slopes and a few narrow, very gently sloping to sloping summits that cannot be economically cultivated. A few native grass meadows that are managed for hay production are in the central and north-central parts of the county.

Logan County has three distinct types of rangeland. The first type is in the southeastern part of the county, in areas where most of the soils are loamy and are moderately deep or shallow over sandstone. These soils support an oak savannah that has low productivity due to the shallow rooting depth and low water-holding capacity.

The second type is in the northeastern and western parts of the county, in areas where the soils are loamy and are dominantly moderately deep, with some shallow and deep soils, over shale and shale interbedded with sandstone. These soils support mid and tall grasses, and productivity is moderate.

The third type is in the north-central, central, and south-central parts of the county, in areas where the soils are loamy and are moderately deep, with some shallow and deep soils, over sandstone and sandstone interbedded with shale. The soils support tall and mid grasses that are moderately productive.

Approximately 75 percent of the annual production on rangeland grows in April, May, and June, responding to spring rains and moderate temperatures. A secondary growth period generally occurs in September and October, coinciding with fall rains and cooling temperatures.

Most of the local ranches and livestock farms are cow-calf operations. There are some pure stocker enterprises and some ranchers that diversify their cow-calf operation with stockers in order to provide greater flexibility.

Several livestock operations supplement the grazing of native rangeland with introduced grasses such as bermudagrass and plains bluestem. Forage crops are also used. Protein, hay, and small grain crops are used to supplement livestock through winter.

Droughts occur in varying lengths. Short-term summer droughts are common, and longer periods of drought, some lasting several months, also occur frequently.

The pre-settlement vegetation evolved with periodic natural fires, droughts,

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
IMPROVED BERMUDAGRASS				5	25	35	20	10	5			
WEeping LOVEGRASS			3	20	25	20	15	6	11			
INTRODUCED BLUESTEM				3	15	26	22	18	10	1		
SMALL GRAIN GRAZEOUT	3	9	29	27	18				1	4	6	3
FORAGE SORGHUM						14	33	33	20			
NATIVE GRASS	1	1	2	10	20	27	16	8	5	2	2	1

Figure 16.—Typical growth curves for various kinds of forage in Logan County. The growth curve for each kind of forage indicates the percentage of the total annual growth that occurs each month.

migratory grazing by bison, and the impact from many other wildlife species. The bison heavily impacted an area and then moved to other grazing range.

Early settlement brought continuous grazing and eliminated much of the high-quality vegetation on some range sites. Areas that were once open savannah range sites with a mixture of grasses, forbs, and scattered trees are now covered with oak, a few tall and mid grasses, and low successional grasses and forbs. Some prairie sites are now producing low successional grasses and forbs instead of tall grasses. The amount of forage currently produced may be less than half of that originally produced. Eastern redcedar has increased significantly on some sites due to the lack of prairie fires.

Remnants of the original plant species, however, are still found on most rangeland. Progressive grazing management can allow these high-quality plants to reestablish without reseeding.

An *ecological site* for rangeland is a distinctive kind of land with specific physical characteristics that make it different from other sites in its ability to produce a distinctive kind and amount of vegetation.

Many different ecological sites are in the survey area. Over time, the combination of plants best suited to a particular soil and climate becomes dominant. If the soil is not excessively disturbed, this group of plants is the natural plant community for the site. Natural plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey; thus, ecological sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at the local office of the Natural Resources Conservation Service, can provide specific information about ecological sites.

*Total dry-weight production* is the amount of vegetation that can be expected to

grow annually on well managed rangeland. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are near the historical monthly average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Figure 16 shows a typical growth curve for native vegetation and other forage that represents the percentage of total growth that occurs each month.

*Dry weight* is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as stage of maturity, exposure, amount of shade, recent rains, and unseasonable dry periods.

*Characteristic vegetation* consists of the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil. The plants are listed by common name. In the composition column, the anticipated percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

## Rangeland Productivity and Characteristic Plant Communities

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
AspA, AstA: Ashport-----	Loamy Bottomland 080AY0500K	8,500	6,100	4,500	big bluestem----- indiangrass----- miscellaneous perennial grasses switchgrass----- little bluestem----- miscellaneous perennial forbs-- eastern gamagrass----- miscellaneous trees-----	25 15 15 15 10 10 5 5
BetA, BetB: Bethany-----	Loamy Prairie 080AY0560K	5,500	3,850	2,750	little bluestem----- big bluestem----- indiangrass----- switchgrass----- blue grama----- miscellaneous perennial forbs-- sideoats grama----- tall dropseed-----	25 20 10 10 5 5 5 5
BocA: Bocox-----	Meadow 080AY0900K	6,500	4,500	2,500	sedge----- rush----- prairie cordgrass----- miscellaneous perennial grasses miscellaneous perennial forbs-- switchgrass----- miscellaneous shrubs----- inland ceanothus----- miscellaneous trees-----	40 25 10 8 5 5 3 2 2
Bt1A: Bathel-----	Depressional Upland 080AY0990K	5,000	3,800	3,000	switchgrass----- barnyardgrass----- miscellaneous perennial grasses prairie cordgrass----- indiangrass----- sedge----- annual grasses----- curlytop knotweed----- miscellaneous perennial forbs-- other annual forbs----- miscellaneous shrubs----- miscellaneous trees----- eastern gamagrass-----	20 15 15 10 8 8 5 5 5 4 2 2 1

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
CaaA: Canadian-----	Loamy Bottomland 080AY0500K	8,500	6,100	4,500	big bluestem-----	25
					indiangrass-----	15
					miscellaneous perennial grasses	15
					switchgrass-----	15
					little bluestem-----	10
					miscellaneous perennial forbs--	10
CAID: Coyle-----	Loamy Prairie 080AY0560K	5,500	3,850	2,750	eastern gamagrass-----	5
					miscellaneous trees-----	5
					little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
Ashport-----	Loamy Bottomland 080AY0500K	8,500	6,100	4,500	blue grama-----	5
					miscellaneous perennial forbs--	5
					sideoats grama-----	5
					tall dropseed-----	5
					big bluestem-----	25
					indiangrass-----	15
Ironmound-----	Shallow Prairie 080AY0830K	3,000	2,100	1,500	miscellaneous perennial grasses	15
					switchgrass-----	15
					little bluestem-----	10
					miscellaneous perennial forbs--	10
					eastern gamagrass-----	5
					miscellaneous trees-----	5
CoIC2: Coyle-----	Reseeded Loamy Prairie 080AY8560K	3,300	2,300	1,650	little bluestem-----	30
					sideoats grama-----	15
					big bluestem-----	10
					blue grama-----	10
					miscellaneous perennial forbs--	10
					miscellaneous perennial grasses	10
Ironmound-----	Reseeded Shallow Prairie 080AY8830K	2,000	1,400	1,000	buffalograss-----	5
					sand dropseed-----	5
					threeawn-----	5
CoUB, CoUC. Coyle-Urban land						---
						---



Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
CoyB: Coyle-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					miscellaneous perennial forbs--	5
CoyC2: Coyle-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	sideoats grama-----	5
					tall dropseed-----	5
					---	---
CoZC3: Coyle-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	---	---
					---	---
					---	---
Zaneis: DAM. Dam	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	---	---
					---	---
					---	---
DerB, DerD, DerE: Derby-----	Deep Sand Savannah 084AY018OK	4,000	2,800	2,000	little bluestem-----	25
					big bluestem-----	20
					blackjack oak-----	10
					miscellaneous perennial grasses	10
					post oak-----	10
					indiangrass-----	5
DiRG: Darsil-----	Shallow Savannah 084AY089OK	3,200	2,100	1,400	Scribner panicum-----	5
					miscellaneous perennial forbs--	5
					miscellaneous shrubs-----	5
					switchgrass-----	5
					little bluestem-----	30
					big bluestem-----	20
Rock outcrop.					blackjack oak-----	10
					miscellaneous perennial grasses	10
					post oak-----	10
					indiangrass-----	5
					miscellaneous perennial forbs--	5
					miscellaneous shrubs-----	5
Rock outcrop.					sideoats grama-----	5
					---	---



Rangeland Productivity and Characteristic Plant Communities—Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
GaGA: Gracemore-----	Subirrigated 080AY0950K	9,000	8,000	7,000	indiangrass-----	30
					miscellaneous perennial grasses	15
					eastern gamagrass-----	10
					sand bluestem-----	10
					sedge-----	10
GMGE4: Grainola-----	Reseeded Claypan Prairie 080AY8100K	3,300	2,300	1,600	miscellaneous shrubs-----	5
					switchgrass-----	5
						---
						---
						---
Masham-----	Reseeded Clay 080AY8800K	2,400	1,700	1,200		---
						---
						---
						---
						---
Gullied land.						
GMLG: Grainola-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	little bluestem-----	25
					big bluestem-----	20
					switchgrass-----	15
					indiangrass-----	10
					blue grama-----	5
Masham-----	Shallow Clay Prairie 080AY0800K	2,400	1,700	1,200	buffalograss-----	5
					sideoats grama-----	5
					sideoats grama-----	25
					buffalograss-----	15
					alkali sacaton-----	10
					blue grama-----	10
					miscellaneous perennial grasses	10
					hairy grama-----	5
					little bluestem-----	5
					miscellaneous perennial forbs--	5
					silver bluestem-----	5
					vine mesquite-----	5
					meadow dropseed-----	4
					fourwing saltbush-----	1

## Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
GMLG: Lucien-----	Shallow Prairie 080AY0830K	3,000	2,100	1,500	little bluestem-----	30
					sideoats grama-----	15
					big bluestem-----	10
					blue grama-----	10
					miscellaneous perennial forbs--	10
					miscellaneous perennial grasses	10
					buffalograss-----	5
GohC, GohE: Goodnight-----	Deep Sand 080AY0140K	4,000	2,700	1,800	sand dropseed-----	5
					threeawn-----	5
					big bluestem-----	25
					little bluestem-----	20
					miscellaneous shrubs-----	10
					switchgrass-----	10
					indiangrass-----	5
GooE, GooG: Goodnight-----	Dune 080AY0220K	3,600	2,700	1,800	blue grama-----	5
					miscellaneous perennial forbs--	5
					miscellaneous perennial grasses	5
					sand lovegrass-----	5
					sand sagebrush-----	5
					sideoats grama-----	5
					little bluestem-----	30
GraC: Grainola-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	sand bluestem-----	20
					switchgrass-----	15
					miscellaneous perennial forbs--	10
					miscellaneous perennial grasses	10
					prairie sandreed-----	10
					Texas bluegrass-----	5
					miscellaneous shrubs-----	3
Grad2: Grainola-----	Reseeded Claypan Prairie 080AY8100K	3,300	2,300	1,600	miscellaneous trees-----	2
					little bluestem-----	25
					big bluestem-----	20
					switchgrass-----	15
					indiangrass-----	10
					blue grama-----	5
					buffalograss-----	5
Grad2: Grainola-----	Reseeded Claypan Prairie 080AY8100K	3,300	2,300	1,600	sideoats grama-----	5
					---	---



## Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
GrLE: Grainola-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	little bluestem----- big bluestem----- switchgrass----- indiangrass----- blue grama----- buffalograss----- sideoats grama-----	25 20 15 10 5 5 5
Lucien-----	Shallow Prairie 080AY0830K	3,000	2,100	1,500	little bluestem----- sideoats grama----- big bluestem----- blue grama----- miscellaneous perennial forbs-- miscellaneous perennial grasses-- buffalograss----- sand dropseed----- threeawn-----	30 15 10 10 10 10 5 5 5
HaGD4: Harrah-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	---	---
Gullied land.						
HarC: Harrah-----	Sandy Savannah (central) 084AY0760K	5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5
HarC2: Harrah-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	---	---

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
HarG: Harrah-----	Sandy Savannah (central) 084AY076OK	5,000	3,500	2,500	little bluestem-----	25
					big bluestem-----	20
					blackjack oak-----	10
					post oak-----	10
					Scribner panicum-----	5
					miscellaneous perennial forbs--	5
					miscellaneous trees-----	5
					purple lovegrass-----	5
					purpletop tridens-----	5
					sand lovegrass-----	5
HawB: Hawley-----	Sandy Bottomland 080AY068OK	3,800	2,700	2,000	switchgrass-----	30
					indiangrass-----	15
					big bluestem-----	15
					annual grasses-----	10
					Texas bluegrass-----	5
					little bluestem-----	5
					miscellaneous perennial forbs--	5
					miscellaneous perennial grasses	5
					miscellaneous trees-----	5
					threawn-----	5
ICGD3: Ironbound-----	Reseeded Shallow Prairie 080AY883OK	2,000	1,400	1,000	---	---
					---	---
					---	---
Coyle-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	---	---
					---	---
Grainola-----	Reseeded Claypan Prairie 080AY810OK	3,300	2,300	1,600	---	---
					---	---
IrCE: Ironbound-----	Shallow Prairie 080AY083OK	3,000	2,100	1,500	little bluestem-----	30
					sideoats grama-----	15
					big bluestem-----	10
					blue grama-----	10
					miscellaneous perennial forbs--	10
					miscellaneous perennial grasses	10
					buffalograss-----	5
					sand dropseed-----	5
					threawn-----	5
					---	---

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year Lb/acre	Normal year Lb/acre	Unfavorable year Lb/acre		
IrCE: Coyle-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
IroC2: Ironmound-----	Reseeded Shallow Prairie 080AY883OK	2,000	1,400	1,000	miscellaneous perennial forbs--	5
					sideoats grama-----	5
					tall dropseed-----	5
					---	---
					---	---
KgFB: Kingfisher-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
KinC2: Kingfisher-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	miscellaneous perennial forbs--	5
					sideoats grama-----	5
					tall dropseed-----	5
					---	---
					---	---
KonB: Konawa-----	Sandy Savannah (central) 084AY076OK	5,000	3,500	2,500	little bluestem-----	25
					big bluestem-----	20
					blackjack oak-----	10
					post oak-----	10
					Scribner panicum-----	5
KonD2: Konawa-----	Reseeded Sandy Savannah 084AY876OK	2,700	1,900	1,300	miscellaneous perennial forbs--	5
					miscellaneous trees-----	5
					purple lovegrass-----	5
					purpletop tridens-----	5
					sand lovegrass-----	5
					switchgrass-----	5
					---	---



Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
KrdA, KrbB: Kirkland-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	little bluestem-----	25
					big bluestem-----	20
					switchgrass-----	15
					indiangrass-----	10
					blue grama-----	5
LarA, LawA: Lawrie-----	Loamy Bottomland 080AY0500K	8,500	6,100	4,500	buffalograss-----	5
					sideoats grama-----	5
					big bluestem-----	25
					indiangrass-----	15
					miscellaneous perennial grasses	15
LerA: Lebron-----	Meadow 080AY0900K	6,500	4,500	2,500	switchgrass-----	15
					little bluestem-----	10
					miscellaneous perennial forbs--	10
					eastern gamagrass-----	5
					miscellaneous trees-----	5
LitB: Littleaxe-----	Sandy Savannah (central) 084AY0760K	5,000	3,500	2,500	sedge-----	40
					rush-----	25
					prairie cordgrass-----	10
					miscellaneous perennial grasses	8
					miscellaneous perennial forbs--	5
LitC2: Littleaxe-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	switchgrass-----	5
					inland ceanothus-----	3
					miscellaneous shrubs-----	2
					miscellaneous trees-----	2
					little bluestem-----	25
LitC2: Littleaxe-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	big bluestem-----	20
					blackjack oak-----	10
					post oak-----	10
					Scribner panicum-----	5
					miscellaneous perennial forbs--	5
LitC2: Littleaxe-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	miscellaneous trees-----	5
					purple lovegrass-----	5
					purpletop tridens-----	5
					sand lovegrass-----	5
					switchgrass-----	5
LitC2: Littleaxe-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	switchgrass-----	5
					switchgrass-----	5
					switchgrass-----	5
					switchgrass-----	5
					switchgrass-----	5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
M-W. Miscellaneous water						
MaID, MaIG:						
Masham-----	Shallow Clay Prairie 080AY080OK	2,400	1,700	1,200	sideoats grama----- buffalograss----- alkali sacaton----- blue grama----- miscellaneous perennial grasses hairy grama----- little bluestem----- miscellaneous perennial forbs-- silver bluestem----- vine mesquite----- meadow dropseed----- fourwing saltbush-----	25 15 10 10 10 5 5 5 5 4 1
Ironmound-----	Shallow Prairie 080AY083OK	3,000	2,100	1,500	little bluestem----- sideoats grama----- big bluestem----- blue grama----- miscellaneous perennial forbs-- miscellaneous perennial grasses buffalograss----- sand dropseed----- threeawn-----	30 15 10 10 10 10 5 5 5
MinB, MinC, MinD, MinF:						
Minco-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem----- big bluestem----- indiangrass----- switchgrass----- blue grama----- miscellaneous perennial forbs-- sideoats grama----- tall dropseed-----	25 20 10 10 5 5 5 5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		<u>Lb/acre</u>	<u>Lb/acre</u>	<u>Lb/acre</u>		
M11A: Miller-----	Heavy Bottomland 080AY0450K	5,500	3,700	2,500	switchgrass-----	15
					blue grama-----	10
					meadow dropseed-----	10
					miscellaneous perennial grasses	10
					sideoats grama-----	10
					western wheatgrass-----	10
					Canada wildrye-----	5
					alkali sacaton-----	5
					buffalograss-----	5
					fourwing saltbush-----	5
MulC: Mulhall-----	Loamy Prairie 080AY0560K	5,500	3,850	2,750	miscellaneous perennial forbs--	5
					prairie cordgrass-----	5
					vine mesquite-----	5
					little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					miscellaneous perennial forbs--	5
MulC2: Mulhall-----	Reseeded Loamy Prairie 080AY8560K	3,300	2,300	1,650	sideoats grama-----	5
					tall dropseed-----	5
NavA, NavB: Navina-----	Sandy Prairie 080AY0730K	4,500	3,200	2,000		
					little bluestem-----	30
					big bluestem-----	25
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					sand sagebrush-----	5
					sideoats grama-----	5
					sand lovegrass-----	3
					skunkbush sumac-----	2
NeGD4: Newalla-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300		
Gullied land.						

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
NewB: Newalla-----	Sandy Savannah (central) 084AY076OK	5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5
NorA, NorB: Norge-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem----- big bluestem----- indiangrass----- switchgrass----- blue grama----- miscellaneous perennial forbs-- sideoats grama----- tall dropseed-----	25 20 10 10 5 5 5 5
NorC2: Norge-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650	---	---
OWHD: Oil waste land.						
Huska-----	Slickspot 080AY091OK	2,000	1,400	1,000	alkali sacaton----- miscellaneous perennial grasses switchgrass----- blue grama----- sideoats grama----- tall dropseed----- Scribner panicum----- dotted gayfeather----- miscellaneous perennial forbs-- silver bluestem----- whorled dropseed-----	15 15 15 10 10 5 5 5 5 5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
PieB: Piedmont-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	little bluestem-----	25
					big bluestem-----	20
					switchgrass-----	15
					indiangrass-----	10
					blue grama-----	5
					buffalograss-----	5
PieC2: Piedmont-----	Reseeded Claypan Prairie 080AY8100K	3,300	2,300	1,600	sideoats grama-----	5
					-----	---
					-----	---
					-----	---
					-----	---
					-----	---
PIT. Pits	Loamy Bottomland 084AY0500K	7,000	4,900	3,500	big bluestem-----	25
					indiangrass-----	15
					switchgrass-----	15
					miscellaneous trees-----	10
					beaked panicum-----	5
					eastern gamagrass-----	5
RenB, RenC: Renfrow-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	miscellaneous perennial forbs--	5
					prairie cordgrass-----	5
					sedge-----	5
					-----	---
					-----	---
					-----	---
RinB: Renthin-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	little bluestem-----	25
					big bluestem-----	20
					switchgrass-----	15
					indiangrass-----	10
					blue grama-----	5
					buffalograss-----	5
RinB: Renthin-----	Claypan Prairie (north) 080AY0100K	4,000	2,800	2,000	sideoats grama-----	5
					-----	---
					-----	---
					-----	---
					-----	---
					-----	---

## Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
RnnC2: Renthin-----	Reseeded Claypan Prairie 080AY8100K	3,300	2,300	1,600	---	---
SDGD4: Stephenville-----	Reseeded Sandy Savannah 084AY8760K	2,700	1,900	1,300	---	---
Darsil-----	Reseeded Shallow Savannah 084AY8890K	1,700	1,100	800	---	---
Gullied land.						
SDND: Stephenville-----	Sandy Savannah (central) 084AY0760K	5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5 5
Darsil-----	Shallow Savannah 084AY0890K	3,200	2,100	1,400	little bluestem----- big bluestem----- blackjack oak----- miscellaneous perennial grasses post oak----- indiangrass----- miscellaneous perennial forbs-- miscellaneous shrubs----- sideoats grama-----	30 20 10 10 10 5 5 5 5
Newalla-----	Sandy Savannah (central) 084AY0760K	5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5 5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
SDND2: Stephenville-----	Reseeded Sandy Savannah 084AY876OK	2,700	1,900	1,300	---	---
Darsil-----	Reseeded Shallow Savannah 084AY889OK	1,700	1,100	800	---	---
Newalla-----	Reseeded Sandy Savannah 084AY876OK	2,700	1,900	1,300	---	---
SlaB, SlaD, SlaF: Slaughterville-----	Sandy Prairie 080AY073OK	4,500	3,200	2,000	little bluestem-----	30
					big bluestem-----	25
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					sand sagebrush-----	5
					sideoats grama-----	5
					sand lovegrass-----	3
					skunkbush sumac-----	2
StDC: Stephenville-----	Sandy Savannah (central) 084AY076OK	5,000	3,500	2,500	little bluestem-----	25
					big bluestem-----	20
					blackjack oak-----	10
					post oak-----	10
					Scribner panicum-----	5
					miscellaneous perennial forbs-----	5
					miscellaneous trees-----	5
					purple lovegrass-----	5
					purpletop tridens-----	5
					sand lovegrass-----	5
Darsil-----	Shallow Savannah 084AY089OK	3,200	2,100	1,400	switchgrass-----	5
					little bluestem-----	30
					big bluestem-----	20
					blackjack oak-----	10
					miscellaneous perennial grasses	10
					post oak-----	10
					indiangrass-----	5
					miscellaneous perennial forbs-----	5
					miscellaneous shrubs-----	5
					sideoats grama-----	5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production				Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year			
		Lb/acre	Lb/acre	Lb/acre	Pct		
StdC2: Stephenville-----	Reseeded Sandy Savannah 084AY876OK	2,700	1,900	1,300	---	---	
		1,700	1,100	800	---	---	
		5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5 5	
Darsil-----	Shallow Savannah 084AY089OK	3,200	2,100	1,400	little bluestem----- big bluestem----- blackjack oak----- miscellaneous perennial grasses post oak----- indiangrass----- miscellaneous perennial forbs-- miscellaneous shrubs----- sideoats grama-----	30 20 10 10 10 5 5 5 5	
		5,000	3,500	2,500	little bluestem----- big bluestem----- blackjack oak----- post oak----- Scribner panicum----- miscellaneous perennial forbs-- miscellaneous trees----- purple lovegrass----- purpletop tridens----- sand lovegrass----- switchgrass-----	25 20 10 10 5 5 5 5 5 5	
		2,700	1,900	1,300	---	---	



Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
SUND. Stephenville-Urban land- Newalla						
TelB: Teller-----	Loamy Prairie 080AY0560K	5,500	3,850	2,750	little bluestem----- big bluestem----- indiangrass----- switchgrass----- blue grama----- miscellaneous perennial forbs-- sideoats grama----- tall dropseed-----	25 20 10 10 5 5 5 5
TelC2: Teller-----	Reseeded Loamy Prairie 080AY8560K	3,300	2,300	1,650	---	---
TriA: Tribbey-----	Subirrigated 084AY0950K	6,000	4,200	3,000	switchgrass----- miscellaneous perennial grasses eastern gamagrass----- miscellaneous shrubs----- sedge----- indiangrass----- big bluestem----- bulrush----- bushy bluestem----- miscellaneous perennial forbs-- prairie cordgrass-----	25 15 10 10 10 5 5 5 5 5 5
URB. Urban land.						
W. Water						
YaaA, YahA: Yahola-----	Loamy Bottomland 080AY0500K	8,500	6,100	4,500	big bluestem----- indiangrass----- miscellaneous perennial grasses switchgrass----- little bluestem----- miscellaneous perennial forbs-- eastern gamagrass----- miscellaneous trees-----	25 15 15 15 10 10 5 5

Rangeland Productivity and Characteristic Plant Communities-Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
ZaHC: Zaneis-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					miscellaneous perennial forbs--	5
					sideoats grama-----	5
					tall dropseed-----	5
Huska-----	Slickspot 080AY091OK	2,000	1,400	1,000	alkali sacaton-----	15
					miscellaneous perennial grasses	15
					switchgrass-----	15
					blue grama-----	10
					sideoats grama-----	10
					tall dropseed-----	10
					Scribner panicum-----	5
					dotted gayfeather-----	5
					miscellaneous perennial forbs--	5
					silver bluestem-----	5
ZanB, ZanC: Zaneis-----	Loamy Prairie 080AY056OK	5,500	3,850	2,750	whorled dropseed-----	5
					little bluestem-----	25
					big bluestem-----	20
					indiangrass-----	10
					switchgrass-----	10
					blue grama-----	5
					miscellaneous perennial forbs--	5
					sideoats grama-----	5
					tall dropseed-----	5
ZanC2: Zaneis-----	Reseeded Loamy Prairie 080AY856OK	3,300	2,300	1,650		
					---	---

## Similarity Index

*Similarity index* indicates, by percentages ranging from 1 to 100, the extent to which the present plant community resembles one of two other plant communities on an ecological site. A similarity index can be used to compare the present vegetation on an ecological site to the presumed historic vegetation for that site. This comparison provides a basis for ascertaining the extent and direction of changes that have differentiated the current vegetation from the historic vegetation. A similarity index of 70 would suggest that the present plant community has 70 percent of the presumed historic plant community for the site.

The management goal is not necessarily a present plant community that has a similarity index of 100 when compared to the historic plant community. A similarity index can be used as a measure of how near the current plant community is to the goal of the landowner, that is, the percentage of the present plant community that resembles a desired plant community.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and cultivation. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed at a severity that does not allow for recovery. A very severe disturbance can completely destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weed-like plants, can increase in abundance. If the plant community and the soils have not deteriorated significantly, the plant community eventually can return to predominantly natural plants if proper range management is applied.

Knowledge of the ecological site is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to support or maintain management objectives, planned grazing systems, proper stocking rates, suitable wildlife management practices, recreational uses, and the condition of watersheds.

## Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the similarity index.

Effective range management conserves rainfall, enhances water quality, reduces the hazard of downstream flooding, improves yields, provides forage for livestock and wildlife, enhances recreational opportunities, and protects the soil. The main management concern is recognizing important changes in the plant cover or the range trend. These changes take place gradually and may be overlooked.

Each range manager should evaluate the type of plant community that best supports the ranch and then apply management and ecological principles to achieve the goals. The desired plant community should be within the capabilities of the land.

The primary range management practices used in Logan County include prescribed grazing, stock-water developments, and fences. If undesirable plants become dominant, range seeding, brush management, or prescribed burning are commonly used.

Range management includes four major considerations:

1. *Proper grazing distribution*, which is achieved by managing livestock so that all parts of the grazing unit are grazed equally.
2. *Selective grazing*, which occurs because animals graze preferred plants to balance their diets. If selective grazing occurs repeatedly, the preferred plants are damaged.
3. *A proper stocking rate*, which is achieved by balancing animal numbers with forage production.

4. *Rest periods* during which grazed plants are given enough rest to recover and to maintain their growth.

It is important to remember that forage production is controlled by rainfall while composition is determined by grazing management.

Setting the stocking rate is not an exact science because there are influences from grazing management systems, season of use, mix of livestock, and seasonal forage production. Some rules of thumb, however, can be helpful. To maintain a nutritional cover of plants, about 50 percent of the annual growth of the key or most important grazing plants should remain at the end of the grazing season. Plants can be removed not only through grazing by livestock but also through grazing by rodents, insects, and wildlife and through the deterioration caused by climatic variations. Because of these factors, a safe initial stocking rate for livestock should be calculated on the basis of 25 percent of the total annual growth, by weight, of the vegetation.

For example, production could be 3,500 pounds per acre of air-dry grasses, forbs, and limited woody species during an average season on a Loamy Prairie ecological site where the similarity between the present plant community and the historic plant community is more than 70 percent. Twenty-five percent of this production is 875 pounds per acre.

A 1,000-pound cow and her calf is equivalent to one animal unit (AU) and will consume about 2.6 percent of her body weight (26 pounds) of forage per day. So, in one month, an animal unit will consume 790 pounds of native vegetation, depending on the quality and stage of growth of the plants (26 pounds per day times 365 days per year divided by 12 months per year).

Dividing 875 pounds (forage allocation) by 26 pounds (forage required per day for one animal unit) suggests that 1 acre of Loamy Prairie ecological site with a similarity index of 70 will feed one cow for 33.6 days. To convert forage available from 1 acre to animal unit month (AUM), the available forage (875 pounds) is divided by the amount required to feed an animal unit for 1 month (790 pounds). One acre will provide 1.1 AUM of grazing. Therefore, 10.9 acres will feed one cow for 12 months in this example. Another approach is to calculate the annual forage needs of an animal unit (790 pounds per month times 12 months equals 9,490 pounds). Dividing the 875 pounds of usable forage per acre into the 9,490 pounds needed by the cow reveals that approximately 10.9 acres is needed for one cow annually. Stocking rate calculation should be adjusted for animal size, grazing system, and grazing season.

More information about planning a grazing program is available from the local office of the Natural Resources Conservation Service.

## Ecological Sites

The ecological site identifier has ten characters. The first four characters identify the major land resource area, the fifth character identifies the major land resource unit subdivision, the next three characters identify the individual ecological site number, and the final two characters identify the state. The ecological site identifier is followed by the proper name for the ecological site. The following paragraphs describe the ecological sites in Logan County and list the plants that are characteristic of each site. Detailed ecological site descriptions are available at the local office of the Natural Resources Conservation Service.

**080AY010OK, Claypan Prairie (north).**—This site is in areas of nearly level to gently sloping, deep and very deep, loamy soils. These soils have a dense clayey subsoil that absorbs water slowly and restricts root penetration. Under good management, the important plants are little bluestem, switchgrass, leadplant, and perennial sunflowers. As the site deteriorates, sideoats grama, blue grama, tall dropseed, wild alfalfa, and buckbrush increase in abundance. Forage production is moderate.

**080AY014OK, Deep Sand.**—This site is in areas of nearly level to sloping, very deep, sandy soils. Forage production is moderate. Areas consist of rolling hills separated by narrow valleys. Under good management, the important plants are sand bluestem, indiagrass, switchgrass, little bluestem, and sand lovegrass. As the site deteriorates, dropseed, blue grama, sandbur, prairie sagewort, skunkbush, and sand plum increase in abundance.

**080AY022OK, Dune.**—This site is in areas of very deep, strongly sloping to steep, sandy soils. Forage production is low. Areas consist of choppy high dunes separated by narrow valleys. Careful grazing management is needed to prevent the development of blowout areas. Under good management, the important plants are sand bluestem, little bluestem, giant sandreed, and sand lovegrass. If this site is abused, Texas bluegrass, sand paspalum, sandlily, bush morningglory, and skunkbush increase in abundance.

**080AY045OK, Heavy Bottomland.**—This site is in areas of nearly level, very gently sloping, very deep, clayey soils on flood plains. These soils absorb water slowly. Large cracks are common during droughty periods. Under good management, the important plants are big bluestem, indiagrass, prairie cordgrass, switchgrass, and perennial sunflowers. If this site is abused, tall dropseed, goldenrods, sedges, and persimmon increase in abundance. Forage production is moderate.

**080AY050OK, Loamy Bottomland.**—This site is in areas of nearly level to sloping, very deep, loamy soils on flood plains or terraces. Forage production is high. Under good management, the important plants are big bluestem, indiagrass, eastern gamagrass, compassplant, and switchgrass. If this site is abused, beaked panicum, tall dropseed, heath aster, sedges, elm, and greenbrier increase in abundance.

**080AY056OK, Loamy Prairie.**—This site is in areas where the climax vegetation is primarily little bluestem, big bluestem, indiagrass, and switchgrass. These plants, together with Canada wildrye, make up about 70 percent of the vegetation. Under continuous heavy grazing, the principal grasses are sideoats grama and blue grama. Leadplant, wildindigo, scurfpea, and prairie acacia are the common legumes.

**080AY068OK, Sandy Bottomland.**—This site is in areas of nearly level, very gently sloping, very deep, sandy soils on flood plains or terraces. These soils are droughty and subject to wind erosion. Forage production is low. Under good management, the important plants are switchgrass, sand bluestem, indiagrass, and perennial sunflowers. If this site is abused, beaked panicum, Texas bluegrass, goldenrods, willow, and cottonwood increase in abundance.

**080AY073OK, Sandy Prairie.**—This site is in areas of very gently sloping to undulating, deep, moderately sandy soils on uplands. Forage production is high. The soils have a moderate water-holding capacity, which benefits root development and moisture storage. Under good management, the important plants are sand bluestem, little bluestem, and indiagrass. If this site is subject to continual heavy grazing, sideoats grama, blue grama, and sand dropseed increase in abundance.

**080AY080OK, Shallow Clay Prairie.**—This site is in areas of severely eroded, gently sloping to strongly sloping, shallow, raw, clayey soils that are underlain by shale. The shale is commonly exposed on the steeper slopes. Vegetation is difficult to establish. Under good management, the important plants are sideoats grama, little bluestem, and hairy grama. If this site is subject to continual heavy grazing, grass cover is reduced and areas of bare soil increase. Carefully managed grazing can prevent erosion. Forage production is very low. This site has some natural erosion.

**080AY083OK, Shallow Prairie.**—This site is in areas where the potential plant community is tall grasses. Species composition, by weight, is 75 percent grasses, 20 percent forbs, and 5 percent woody plants. Big bluestem, indiagrass, switchgrass, little bluestem, tephrosia, catclaw sensitivebrier, perennial sunflowers, and skunkbush are preferred plants and make up 65 percent of livestock forage when the site is in excellent condition. If the site is subject to continuous heavy grazing, these plants are

replaced by less palatable plants, such as dropseeds, jointtail, Scribner panicum, buffalograss, wildindigo, milkweeds, sagewort, sumacs, and indigobush. As the site deteriorates, other plants, such as broomsedge bluestem, splitbeard, Japanese brome, showy partridgepea, common broomweed, ragweeds, bitter sneezeweed, crotons, persimmon, and hawthorn, dominate the site.

**080AY090OK, Meadow.**—This site is in areas where the vegetation includes grasses, sedges, rushes, buttonbush, and various broadleaf plants. Willow and cottonwood trees are common. In these areas, water is ponded for long or very long periods but the areas typically do not have standing water during the growing season. For a considerable part of the year, the water table is within a depth of a few inches.

**080AY091OK, Slickspot.**—This site is in areas of gently sloping, deep and very deep, loamy soils on uplands. These soils have a clayey, alkali subsoil with blocky structure. Forage production is low because of a slow rate of water intake, salt content, and poor aeration. Under good management, the important plants, which are alkali sacaton, switchgrass, western wheatgrass, tall dropseed, white tridens, and blue grama, make up 50 percent of the vegetation. Other plants include dotted gayfeather, whorled dropseed, gummy lovegrass, fall witchgrass, yellow neptunia, mourning lovegrass, purple threeawn, curlycup gumweed, goldenweed, and hairy goldaster. If the site is abused, blue grama, silver bluestem, wild alfalfa, lanceleaf ragweed, threeawn, and western ragweed increase in abundance.

**080AY095OK, Subirrigated.**—This site is in areas of deep, nearly level, very gently sloping, sandy soils on uplands or flood plains. These soils have a high water table, which is beneficial to plant growth. Forage production is high. Under good management, the important plants are switchgrass, big bluestem, indiangrass, and eastern gamagrass. If the site is abused, tall dropseed, sideoats grama, sedges, willow, and cottonwood increase in abundance.

**080AY099OK, Depressional Upland.**—This site is in areas where, depending upon the degree of inundation, the dominant plants are willow, switchgrass, prairie cordgrass, indiangrass, cattails, western wheatgrass, sedges, bristlegrass, Illinois bundleflower, duckweed, sedges, and other forbs.

**080AY810OK, Reseeded Claypan Prairie.**—This site is in areas of formerly cultivated land that typically are seeded to sideoats grama, blue grama, little bluestem, sand bluestem, and indiangrass. The site may have been damaged by erosion, and soil fertility is inherently low. If the site is abused, broomweeds and threeawn dominate.

**080AY856OK, Reseeded Loamy Prairie.**—This site is in areas where the plant cover includes big bluestem, switchgrass, little bluestem, indiangrass, and other seeded species. Native legumes can be abundant. Other important grasses are jointtail, meadow dropseed, tall dropseed, and hairy grama. Production is much lower than the Loamy Prairie ecological site due to a lower quality of soil health.

**080AY880OK, Reseeded Clay.**—This site is in areas of severely eroded, deep, loamy, upland soils that were formerly cultivated and have a clay subsoil. When reseeded and well managed, this site can support little bluestem, big bluestem, indiangrass, switchgrass, and sideoats grama. If the site is abused, annual threeawn, western ragweed, blue grama, buffalograss, and common broomweed dominate. Carefully managing grazing can prevent erosion. Forage production is very low.

**080AY883OK, Reseeded Shallow Prairie.**—This site is in areas where the seeded grasses include sideoats grama and native bluestem mixes. If the site is heavily grazed, the dominant plants are hairy grama, buffalograss, dropseed, silver bluestem, cheatgrass, broomweed, western ragweed, and other weedy grasses and forbs. Because of past use and erosion, this site is not productive.

**084AY018OK, Deep Sand Savannah.**—This site is in areas of very gently sloping to moderately steep, very deep, sandy soils on uplands. Under good management, the important plants consist of an overstory of post oak and blackjack oak and an



understory of big bluestem, sand lovegrass, and switchgrass. The trees occur in thick stands or in scattered stands. As trees thicken, herbaceous vegetation decreases in abundance. If the site is abused, tall dropseed, purpletop, Scribner panicum, heathaster, white snakeroot, splitbeard bluestem, broomsedge bluestem, winged elm, hickory, buckbrush, sumac, and shrubby oak increase in abundance. Eastern redcedar can increase in abundance if the site is not subject to fires.

**084AY050OK, Loamy Bottomland.**—This site is in areas where the pristine plant community is tall grasses. Species composition, by weight, is 70 percent grasses, 20 percent forbs, and 10 percent woody plants. Eastern gamagrass, Florida paspalum, prairie cordgrass, big bluestem, indiagrass, switchgrass, switchcane, leadplant, Illinois bundleflower, compassplant, gayfeather, and passion vine are the major plants and make up 75 percent of the production when the site is in top ecological condition. If the site is heavily grazed, these plants are replaced by such plants as little bluestem, tall dropseed, Scribner panicum, sedges, rushes, wildindigo, perennial sunflowers, goldenrods, trumpetvine, winged elm, sumacs, and indigobush. As the site deteriorates, unpalatable plants, such as silver bluestem, splitbeard bluestem, broomsedge bluestem, sideoats grama, Japanese brome, threeawns, showy partridgepea, ragweeds, bitter sneezeweed, ironweed, white snakeroot, persimmon, hawthorn, post oak, and blackjack oak, dominate.

**084AY076OK, Sandy Savannah (central).**—This site is in areas where the decreaser grasses are little bluestem, indiagrass, big bluestem, and switchgrass. These grasses make up at least 45 percent of the total vegetation. Canada wildrye, Virginia wildrye, Texas bluegrass, and flatsedge are cool-season species. Woody species include post oak, blackjack oak, hickory, ash, elm, bumelia, coralberry, persimmon, poison ivy, grape, and hackberry. These species should not exceed 20 percent of the total cover.

**084AY089OK, Shallow Savannah.**—This site is in areas that have a savannah where 15 percent of the coverage is post oak, blackjack oak, and other scrub woody species of little commercial value. The principal grasses, which make up 55 to 65 percent of the vegetation, include little bluestem, big bluestem, switchgrass, indiagrass, and Canada wildrye. The less dominant grasses are hairy grama, tall dropseed, and meadow dropseed. Invader plants include splitbeard, silver bluestem, eastern redcedar, and threeawn.

**084AY095OK, Subirrigated.**—This site is in areas of very deep, nearly level and very gently sloping, sandy soils on flood plains. These soils have a high water table, which is beneficial to plant growth. Forage production is high. Under good management, the important plants are switchgrass, big bluestem, indiagrass, and eastern gamagrass. If the site is subject to continual abuse, tall dropseed, sideoats grama, sedges, willow, and cottonwood increase in abundance.

**084AY876OK, Reseeded Sandy Savannah.**—This site is in areas where former cropland is typically seeded to a mixture of big bluestem, little bluestem, indiagrass, switchgrass, sideoats grama, and other grasses. If the land is abused, these plants are replaced by red lovegrass, gummy lovegrass, dropseeds, Scribner panicum, fall witchgrass, wild buckwheat, ragweed, and sandbur.

**084AY889OK, Reseeded Shallow Savannah.**—This site is in areas where the principal seeded grasses are little bluestem, blue grama, and sideoats grama. Other grasses include big bluestem, indiagrass, and switchgrass. As the site deteriorates, grasses such as red lovegrass, mourning lovegrass, and splitbeard bluestem increase in abundance.

## Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of

low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under given climatic conditions. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

The table "Windbreaks and Environmental Plantings" shows the height that locally grown trees and shrubs are expected to reach in 20 years on the soils in Logan County. The estimates in this table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service or from a local nursery.



## Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
AspA, AstA: Ashport-----	---	common lilac, shrub lespedeza, Amur honeysuckle, American plum	eastern redbud, Rocky Mountain juniper, oriental arborvitae, Austrian pine, bur oak	Osage-orange, red mulberry, common hackberry, green ash, lacebark elm, black locust
Beta, BetB: Bethany-----	American plum	common lilac, Amur honeysuckle, eastern redbud, oriental arborvitae	bur oak, Osage-orange, ponderosa pine, red mulberry, black locust, common hackberry, lacebark elm	loblolly pine
BocA. Bocox				
Bt1A. Bathel				
CaaA: Canadian-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	Austrian pine, bur oak, common hackberry, lacebark elm, ponderosa pine, green ash, black locust, loblolly pine	---
CAID: Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
Ashport-----	---	common lilac, shrub lespedeza, Amur honeysuckle, American plum	eastern redbud, Rocky Mountain juniper, oriental arborvitae, Austrian pine, bur oak	Osage-orange, red mulberry, common hackberry, green ash, lacebark elm, black locust
Ironmound.				

## Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
CoIC2: Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
Ironmound.				
CoUB: Coyle-----	American plum	eastern redbud, oriental arborvitae	Austrian pine, Rocky Mountain juniper, common hackberry, lacebark elm, Osage-orange, ponderosa pine, red mulberry, bur oak, green ash, black locust, loblolly pine	---
Urban land.				
CoUC: Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
Urban land.				
CoyB, CoyC2: Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
CoZC3: Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---



## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
GadA: Gaddy-----	American plum	---	Rocky Mountain juniper, bur oak, oriental arborvitae, ponderosa pine, Austrian pine, Osage-orange, common hackberry, green ash, lacebark elm, loblolly pine	black locust ---
GaGA: Gaddy-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	Austrian pine, bur oak, common hackberry, lacebark elm, ponderosa pine, green ash, black locust, loblolly pine	---
Gracemore.				
GMGE4: Grainola-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
Masham.				
Gullied land.				
GMLG: Grainola-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
Masham.				
Lucien.				

Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
GohC: Goodnight-----	American plum	eastern redbud, oriental arborvitae	Austrian pine, Rocky Mountain juniper, bur oak, common hackberry, green ash, ponderosa pine, lacebark elm, Osage-orange	black locust, loblolly pine
				---
GohE, GooE, GooG: Goodnight-----	American plum	---	Rocky Mountain juniper, bur oak, oriental arborvitae, ponderosa pine, Austrian pine, Osage-orange, common hackberry, green ash, lacebark elm, loblolly pine	black locust
				---
GraC, GraD2: Grainola-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
				---
GrHC: Grant-----	shrub lespedeza	Amur honeysuckle, American plum	eastern redbud, Scotch pine, Rocky Mountain juniper, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Osage-orange, bur oak, common hackberry, green ash, lacebark elm, black locust
				---
Huska.				
GrIE: Grainola-----	sand plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
				---
Ironmound.				

## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
GrLE: Grainola-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---	---
Lucien.					
HaGD4: Harrah-----	---	shrub lespedeza, Amur honeysuckle, American plum	Rocky Mountain juniper, eastern redbud, ponderosa pine, oriental arborvitae, Scotch pine	Austrian pine, bur oak, Osage-orange, red mulberry, common hackberry, green ash, lacebark elm	black locust
Gullied land.					
HarC, HarC2, HarG: Harrah-----	---	shrub lespedeza, Amur honeysuckle, American plum	Rocky Mountain juniper, eastern redbud, ponderosa pine, oriental arborvitae, Scotch pine	Austrian pine, bur oak, Osage-orange, red mulberry, common hackberry, green ash, lacebark elm	black locust
HawB: Hawley-----	shrub lespedeza	Amur honeysuckle, American plum	eastern redbud, Scotch pine, Rocky Mountain juniper, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Osage-orange, bur oak, common hackberry, green ash, lacebark elm, black locust	---
ICGD3: Ironmound.					
CoyLe-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---	---

## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
ICGD3: Grainola-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
IrCE: Ironmound.				
Coyle-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
IroC2. Ironmound				
Kgfb, KinC2: Kingfisher-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	bur oak, common hackberry, lacebark elm, Osage-orange, ponderosa pine, green ash, black locust	---
KonB, KonD2: Konawa-----	---	shrub lespedeza, Amur honeysuckle, American plum	Rocky Mountain juniper, eastern redbud, ponderosa pine, oriental arborvitae, Scotch pine	Austrian pine, bur oak, Osage-orange, red mulberry, common hackberry, green ash, lacebark elm
KrdA, KrbB: Kirkland-----	American plum, Amur honeysuckle, common lilac	eastern redbud, oriental arborvitae	bur oak, Osage-orange, ponderosa pine, red mulberry, black locust, common hackberry, lacebark elm	loblolly pine
				---

## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
LarA, LawA: Lawrie-----	shrub lespedeza	Amur honeysuckle, American plum	eastern rebud, Scotch pine, Rocky Mountain juniper, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Osage-orange, bur oak, common hackberry, green ash, lacebark elm, black locust
LerA. Lebron				---
LitB: Littleaxe-----	---	Amur honeysuckle, American plum	Rocky Mountain juniper, eastern rebud, ponderosa pine, oriental arborvitae, Scotch pine	Osage-orange, red mulberry, Austrian pine, green ash, common hackberry, lacebark elm
LitC2: Littleaxe-----	American plum	Rocky Mountain juniper, eastern rebud	oriental arborvitae, Austrian pine, common hackberry, green ash, lacebark elm, Osage-orange, Shumard's oak	---
M-W. Miscellaneous water				
MaID, MaIG. Masham-Ironmound				
MinB, MinC, MinD, MinF: Minco-----	shrub lespedeza	Amur honeysuckle, American plum	eastern rebud, Scotch pine, Rocky Mountain juniper, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Osage-orange, bur oak, common hackberry, green ash, lacebark elm, black locust
				---



## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
M11A: Miller-----	American plum	common lilac, Amur honeysuckle, eastern redbud, oriental arborvitae	bur oak, Osage-orange, ponderosa pine, red mulberry, black locust, common hackberry, lacebark elm	loblolly pine   <





## Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
SlAD, SlAF: Slaughterville-----	American plum	eastern redbud, oriental arborvitae, Rocky Mountain juniper	Austrian pine, bur oak, common hackberry, lacebark elm, penderosa pine, green ash, black locust, loblolly pine	---
StDC: Stephenville-----	American plum	Rocky Mountain juniper, eastern redbud	oriental arborvitae, Osage-orange, bur oak, common hackberry, lacebark elm, black locust, green ash	---
Darsil.				
StDC2: Stephenville-----	American plum	Rocky Mountain juniper, eastern redbud	oriental arborvitae, Osage-orange, common hackberry, lacebark elm, green ash	---
Darsil.				
StDE: Stephenville-----	American plum	Rocky Mountain juniper, eastern redbud	oriental arborvitae, Osage-orange, bur oak, common hackberry, lacebark elm, black locust, green ash	---
Darsil.				
SteB, SteC2: Stephenville-----	American plum	Rocky Mountain juniper, eastern redbud	oriental arborvitae, Osage-orange, common hackberry, lacebark elm, green ash	---

## Windbreaks and Environmental Plantings-Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--			
	<8	8-15	16-25	26-35
SUND: Stephenville-----	American plum	Rocky Mountain juniper, eastern redbud	oriental arborvitae, Osage-orange, common hackberry, lacebark elm, green ash	---
Urban land.				
Newalla-----	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	ponderosa pine, bur oak, Osage-orange, black locust, red mulberry	---
TelB, TelC2: Teller-----	shrub lespedeza	Amur honeysuckle, American plum	eastern redbud, Scotch pine, Rocky Mountain juniper, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	---
TriA. Tribbey				
URB. Urban land				
W. Water				
Yaaa, Yaha: Yahola-----	---	common lilac, shrub lespedeza, Amur honeysuckle, American plum	eastern redbud, Rocky Mountain juniper, oriental arborvitae, Austrian pine, bur oak	---



## Recreation

The soils of the survey area are rated in tables “Recreational Development, Part I” and “Recreational Development, Part II” according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses.

*Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

*Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

*Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in the tables “Recreational Development, Part I” and “Recreational Development, Part II” can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic

areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Playgrounds* require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Off-road motorcycle trails* require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.



## Recreational Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
AstA: Ashport-----	90	Very limited Flooding	1.00	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
BetA, BetB: Bethany-----	93	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.41
BocA: Bocox-----	94	Very limited Depth to saturated zone Ponding Too sandy	1.00 1.00 0.27	Very limited Depth to saturated zone Ponding Too sandy	1.00 1.00 0.27	Very limited Depth to saturated zone Ponding Too sandy	1.00 1.00 0.27
Bt1A: Bathel-----	94	Very limited Ponding Too sandy	1.00 0.87	Very limited Ponding Too sandy	1.00 0.87	Very limited Ponding Too sandy	1.00 0.87
CaaA: Canadian-----	94	Very limited Flooding	1.00	Not limited		Not limited	
CAID: Coyle-----	31	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Slope Restricted permeability Depth to bedrock	0.50 0.44 0.06
Ashport-----	28	Very limited Flooding	1.00	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
Ironmound-----	22	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.44
CoIC2: Coyle-----	61	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Slope Restricted permeability Depth to bedrock	0.50 0.44 0.03

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoIC2: Ironmound-----	33	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Slope Restricted permeability	1.00 0.50 0.44
CoUB: Coyle-----	55	Not limited		Not limited		Not limited	
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Depth to bedrock Restricted permeability Slope	0.54 0.44 0.12
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44
CoyC2: Coyle-----	91	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Depth to bedrock Slope Restricted permeability	0.71 0.50 0.44
CoZC3: Coyle-----	70	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Slope Restricted permeability Depth to bedrock	0.50 0.44 0.35
Zaneis-----	15	Not limited		Not limited		Somewhat limited Slope	0.50
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37
DerD: Derby-----	90	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37	Very limited Slope Too sandy	1.00 0.37
DerE: Derby-----	90	Somewhat limited Slope Too sandy	0.63 0.37	Somewhat limited Slope Too sandy	0.63 0.37	Very limited Slope Too sandy	1.00 0.37

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DiRG: Darsil-----	67	Very limited Slope Depth to bedrock Too sandy	1.00 1.00 0.34	Very limited Slope Depth to bedrock Too sandy	1.00 1.00 0.34	Very limited Slope Depth to bedrock Too sandy	1.00 1.00 0.34
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96
DouD: Dougherty-----	91	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Very limited Slope Too sandy	1.00 0.96
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
GadA: Gaddy-----	85	Very limited Flooding Too sandy	1.00 0.79	Somewhat limited Too sandy	0.79	Somewhat limited Too sandy Flooding	0.79 0.60
GaGA: Gaddy-----	67	Very limited Flooding	1.00	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
Gracemore-----	23	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 0.40	Very limited Depth to saturated zone Flooding	1.00 1.00
GMGE4: Grainola-----	40	Somewhat limited Restricted permeability Slope	0.45 0.16	Somewhat limited Restricted permeability Slope	0.45 0.16	Very limited Slope Restricted permeability Content of large stones Gravel content Depth to bedrock	1.00 0.45 0.05 0.02 0.01
Masham-----	30	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.16	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.16	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.45
Gullied land-----	20	Not rated		Not rated		Not rated	

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GMLG: Grainola-----	37	Very limited Slope Restricted permeability Gravel content	1.00 0.45 0.24	Very limited Slope Restricted permeability Gravel content	1.00 0.45 0.24	Very limited Slope Gravel content Depth to bedrock Restricted permeability Content of large stones	1.00 1.00 0.46 0.45 0.08
Masham-----	22	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45
Lucien-----	21	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability Content of large stones	1.00 1.00 0.45 0.03
GohC: Goodnight-----	92	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy Slope	0.87 0.12
GohE: Goodnight-----	92	Somewhat limited Too sandy Slope	0.87 0.16	Somewhat limited Too sandy Slope	0.87 0.16	Very limited Slope Too sandy	1.00 0.87
GooE: Goodnight-----	92	Very limited Too sandy	1.00	Very limited Too sandy	1.00	Very limited Too sandy Slope	1.00 1.00
GooG: Goodnight-----	92	Very limited Slope Too sandy	1.00 1.00	Very limited Too sandy Slope	1.00 1.00	Very limited Slope Too sandy	1.00 1.00
GraC: Grainola-----	88	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Slope Restricted permeability Depth to bedrock Content of large stones Gravel content	0.50 0.45 0.29 0.05 0.02

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GraD2: Grainola-----	89	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Very limited Slope Restricted permeability Content of large stones Gravel content Depth to bedrock	1.00 0.45 0.05 0.02 0.01
GrHC: Grant-----	45	Not limited		Not limited		Somewhat limited Slope	0.50
Huska-----	35	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Restricted permeability Slope Salinity	1.00 0.45 0.12 0.01
GrIE: Grainola-----	71	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.41	Very limited Slope Restricted permeability Content of large stones Gravel content Depth to bedrock	1.00 0.41 0.05 0.02 0.01
Ironmound-----	20	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 1.00
GrLE: Grainola-----	55	Somewhat limited Restricted permeability Slope	0.45 0.04	Somewhat limited Restricted permeability Slope	0.45 0.04	Very limited Slope Depth to bedrock Restricted permeability Content of large stones Gravel content	1.00 0.74 0.45 0.05 0.02
Lucien-----	26	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.04	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.04	Very limited Depth to bedrock Slope Restricted permeability Content of large stones	1.00 1.00 0.45 0.03
HaGD4: Harrah-----	70	Not limited		Not limited		Very limited Slope	1.00
Gullied land-----	15	Not rated		Not rated		Not rated	

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HarC, HarC2: Harrah-----	91	Not limited		Not limited		Somewhat limited Slope	0.50
HarG: Harrah-----	86	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
HawB: Hawley-----	94	Very limited Flooding Too sandy	1.00 0.87	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy	0.87
ICGD3: Ironmound-----	40	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.44
Coyle-----	30	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Very limited Slope Restricted permeability Depth to bedrock	1.00 0.44 0.10
Grainola-----	15	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Very limited Slope Restricted permeability Depth to bedrock Content of large stones Gravel content	1.00 0.44 0.16 0.05 0.02
IrCE: Ironmound-----	53	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.44 0.16	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.44 0.16	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.44
Coyle-----	22	Somewhat limited Restricted permeability Slope	0.44 0.16	Somewhat limited Restricted permeability Slope	0.44 0.16	Very limited Slope Depth to bedrock Restricted permeability	1.00 0.80 0.44
IroC2: Ironmound-----	90	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Restricted permeability	1.00 0.44	Very limited Depth to bedrock Slope Restricted permeability	1.00 0.50 0.44
KgfB: Kingfisher-----	90	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KinC2: Kingfisher-----	90	Somewhat limited Restricted permeability	0.44	Somewhat limited Restricted permeability	0.44	Somewhat limited Depth to bedrock Slope Restricted permeability	0.71 0.50 0.44
KonB: Konawa-----	96	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96
KonD2: Konawa-----	96	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Very limited Slope Too sandy	1.00 0.96
KrdA, KrkB: Kirkland-----	90	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45
LarA: Lawrie-----	94	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
LawA: Lawrie-----	86	Very limited Flooding	1.00	Not limited		Not limited	
LerA: Lebron-----	80	Very limited Depth to saturated zone Flooding Restricted permeability Too clayey Ponding	1.00 1.00 1.00 1.00 1.00	Very limited Depth to saturated zone Restricted permeability Too clayey Ponding	1.00 1.00 1.00 1.00 1.00	Very limited Depth to saturated zone Restricted permeability Too clayey Ponding Flooding	1.00 1.00 1.00 1.00 1.00 0.60
LitB: Littleaxe-----	80	Not limited		Not limited		Not limited	
LitC2: Littleaxe-----	80	Not limited		Not limited		Somewhat limited Slope	0.50
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.37	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.45 0.37	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.45
Ironmound-----	27	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.44 0.16	Very limited Depth to bedrock Restricted permeability Slope	1.00 0.44 0.16	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.44

## Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaIG: Masham-----	73	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.45
Ironmound-----	17	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.44	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.44	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 0.44
MinB: Minco-----	91	Not limited		Not limited		Not limited	
MinC: Minco-----	91	Not limited		Not limited		Somewhat limited Slope	0.50
MinD: Minco-----	91	Not limited		Not limited		Very limited Slope	1.00
MinF: Minco-----	91	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
M11A: Miller-----	95	Very limited Flooding Too clayey Restricted permeability	1.00 0.50 0.45	Somewhat limited Too clayey Restricted permeability	0.50 0.45	Somewhat limited Flooding Too clayey Restricted permeability	0.60 0.50 0.45
MulC, MulC2: Mulhall-----	88	Not limited		Not limited		Somewhat limited Slope	0.50
NavA, NavB: Navina-----	96	Not limited		Not limited		Not limited	
NeGD4: Newalla-----	75	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Slope Restricted permeability	0.88 0.45
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45
NorA: Norge-----	93	Not limited		Not limited		Not limited	
NorB: Norge-----	90	Not limited		Not limited		Not limited	



## Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NorC2: Norge-----	88	Not limited		Not limited		Somewhat limited Slope	0.50
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01
PieB: Piedmont-----	92	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45
PieC2: Piedmont-----	93	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Depth to bedrock Slope Restricted permeability	0.71 0.50 0.45
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA: Pulaski-----	85	Very limited Flooding	1.00	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
PulA: Pulaski-----	85	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
RenB: Renfrow-----	89	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45
RenC: Renfrow-----	89	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Slope Restricted permeability	0.50 0.45
RewC2: Renfrow-----	84	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Slope Restricted permeability	0.50 0.45
RinB: Renthin-----	81	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RnnC2: Renthin-----	80	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Somewhat limited Slope Restricted permeability	0.50 0.45
SDGD4: Stephenville-----	32	Not limited		Not limited		Very limited Slope Depth to bedrock Content of large stones	1.00 0.97 0.03
Darsil-----	31	Very limited Depth to bedrock Too sandy	1.00 0.34	Very limited Depth to bedrock Too sandy	1.00 0.34	Very limited Depth to bedrock Slope Too sandy	1.00 1.00 0.34
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Not limited		Not limited		Very limited Slope Depth to bedrock Content of large stones	1.00 0.65 0.03
Darsil-----	29	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 1.00
Newalla-----	21	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Very limited Slope Restricted permeability	1.00 0.45
SDND2: Stephenville-----	44	Not limited		Not limited		Very limited Slope Depth to bedrock Content of large stones	1.00 0.46 0.03
Darsil-----	33	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 1.00
Newalla-----	20	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Very limited Slope Restricted permeability	1.00 0.45
SlaB: Slaughterville-----	95	Not limited		Not limited		Not limited	
SlaD: Slaughterville-----	95	Not limited		Not limited		Very limited Slope	1.00

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SlaF: Slaughterville-----	95	Somewhat limited Slope	0.96	Somewhat limited Slope	0.96	Very limited Slope	1.00
StDC: Stephenville-----	55	Not limited		Not limited		Somewhat limited Slope Depth to bedrock Content of large stones	0.50 0.46 0.03
Darsil-----	30	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 0.12
StDC2: Stephenville-----	55	Not limited		Not limited		Somewhat limited Slope Content of large stones Depth to bedrock	0.12 0.03 0.01
Darsil-----	30	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 0.12
StDE: Stephenville-----	50	Somewhat limited Slope	0.96	Somewhat limited Slope	0.96	Very limited Slope Depth to bedrock Content of large stones	1.00 0.71 0.03
Darsil-----	40	Very limited Depth to bedrock Too sandy	1.00 0.34	Very limited Depth to bedrock Too sandy	1.00 0.34	Very limited Depth to bedrock Slope Too sandy	1.00 1.00 0.34
SteB: Stephenville-----	94	Not limited		Not limited		Somewhat limited Content of large stones	0.03
SteC2: Stephenville-----	92	Not limited		Not limited		Somewhat limited Depth to bedrock Slope Content of large stones	0.54 0.50 0.03
SUND: Stephenville-----	35	Not limited		Not limited		Very limited Slope Depth to bedrock Content of large stones	1.00 0.65 0.03
Urban land-----	30	Not rated		Not rated		Not rated	

## Recreational Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SUND: Newalla-----	15	Somewhat limited Restricted permeability	0.45	Somewhat limited Restricted permeability	0.45	Very limited Slope Restricted permeability	1.00 0.45
TelB: Teller-----	96	Not limited		Not limited		Not limited	
TelC2: Teller-----	96	Not limited		Not limited		Somewhat limited Slope	0.50
TriA: Tribbey-----	90	Very limited Flooding Depth to saturated zone	1.00 0.39	Somewhat limited Flooding Depth to saturated zone	0.40 0.19	Very limited Flooding Depth to saturated zone	1.00 0.39
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
ZaHC: Zaneis-----	55	Not limited		Not limited		Somewhat limited Slope	0.50
Huska-----	25	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Restricted permeability Salinity	1.00 0.45 0.01	Very limited Sodium content Slope Restricted permeability Salinity	1.00 0.50 0.45 0.01
ZanB: Zaneis-----	87	Not limited		Not limited		Not limited	
ZanC, ZanC2: Zaneis-----	87	Not limited		Not limited		Somewhat limited Slope	0.50

## Recreational Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Not limited		Not limited		Somewhat limited Flooding	0.60
AstA: Ashport-----	90	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
BetA, BetB: Bethany-----	93	Not limited		Not limited		Not limited	
BocA: Bocox-----	94	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too sandy	0.27	Too sandy	0.27	Droughty	0.01
Bt1A: Bathel-----	94	Very limited Ponding	1.00	Very limited Ponding	1.00	Very limited Ponding	1.00
		Too sandy	0.87	Too sandy	0.87		
CaaA: Canadian-----	94	Not limited		Not limited		Not limited	
CAID: Coyle-----	31	Not limited		Not limited		Somewhat limited Depth to bedrock	0.06
Ashport-----	28	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
Ironmound-----	22	Not limited		Not limited		Very limited Depth to bedrock	1.00
						Droughty	0.46
CoIC2: Coyle-----	61	Not limited		Not limited		Somewhat limited Depth to bedrock	0.03
Ironmound-----	33	Not limited		Not limited		Very limited Depth to bedrock	1.00
						Droughty	0.65
CoUB: Coyle-----	55	Not limited		Not limited		Somewhat limited Depth to bedrock	0.97
						Droughty	0.04
Urban land-----	40	Not rated		Not rated		Not rated	

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoUC: Coyle-----	42	Not limited		Not limited		Somewhat limited Depth to bedrock	0.54
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Not limited		Not limited		Somewhat limited Depth to bedrock	0.35
CoyC2: Coyle-----	91	Not limited		Not limited		Somewhat limited Depth to bedrock	0.71
CoZC3: Coyle-----	70	Not limited		Not limited		Somewhat limited Depth to bedrock	0.35
Zaneis-----	15	Not limited		Not limited		Not limited	
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37	Somewhat limited Droughty	0.14
DerD: Derby-----	90	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37	Somewhat limited Droughty	0.27
DerE: Derby-----	90	Somewhat limited Too sandy	0.37	Somewhat limited Too sandy	0.37	Somewhat limited Slope Droughty	0.63 0.25
DiRG: Darsil-----	67	Very limited Slope Too sandy	1.00 0.34	Somewhat limited Too sandy Slope	0.34 0.22	Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB, DouD: Dougherty-----	91	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Not limited	
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Not limited		Not limited		Somewhat limited Flooding	0.60
GadA: Gaddy-----	85	Somewhat limited Too sandy	0.79	Somewhat limited Too sandy	0.79	Somewhat limited Flooding Droughty	0.60 0.25

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GaGA: Gaddy-----	67	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding Droughty	1.00 0.14
Gracemore-----	23	Very limited Depth to saturated zone Flooding	1.00 0.40	Very limited Depth to saturated zone Flooding	1.00 0.40	Very limited Flooding Depth to saturated zone	1.00 1.00
GMGE4: Grainola-----	40	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Slope Content of large stones Depth to bedrock	0.16 0.05 0.01
Masham-----	30	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Very limited Depth to bedrock Droughty Slope	1.00 0.71 0.16
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Not limited		Not limited		Very limited Slope Depth to bedrock Gravel content Content of large stones	1.00 0.46 0.24 0.08
Masham-----	22	Very limited Water erosion Slope	1.00 1.00	Very limited Water erosion Slope	1.00 0.22	Very limited Depth to bedrock Slope Droughty	1.00 1.00 0.97
Lucien-----	21	Somewhat limited Slope	0.18	Not limited		Very limited Depth to bedrock Slope Droughty Content of large stones	1.00 1.00 0.43 0.03
GohC: Goodnight-----	92	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy	0.87	Somewhat limited Droughty	0.62
GohE: Goodnight-----	92	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy	0.87	Somewhat limited Droughty Slope	0.61 0.16
GooE: Goodnight-----	92	Very limited Too sandy	1.00	Very limited Too sandy	1.00	Somewhat limited Droughty	0.81

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GooG: Goodnight-----	92	Very limited Too sandy Slope	1.00 0.92	Very limited Too sandy	1.00	Very limited Slope Droughty	1.00 0.85
GraC: Grainola-----	88	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.29 0.05
GraD2: Grainola-----	89	Not limited		Not limited		Somewhat limited Content of large stones Depth to bedrock	0.05 0.01
GrHC: Grant-----	45	Not limited		Not limited		Not limited	
Huska-----	35	Not limited		Not limited		Very limited Sodium content Droughty Salinity	1.00 0.08 0.01
GrIE: Grainola-----	71	Not limited		Not limited		Somewhat limited Content of large stones Depth to bedrock	0.05 0.01
Ironmound-----	20	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 0.74
GrLE: Grainola-----	55	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Depth to bedrock Content of large stones Slope	0.74 0.05 0.04
Lucien-----	26	Not limited		Not limited		Very limited Depth to bedrock Droughty Slope Content of large stones	1.00 0.99 0.04 0.03
HaGD4: Harrah-----	70	Not limited		Not limited		Not limited	
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Not limited		Not limited		Not limited	
HarG: Harrah-----	86	Somewhat limited Slope	0.98	Not limited		Very limited Slope	1.00



## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HawB: Hawley-----	94	Somewhat limited Too sandy	0.87	Somewhat limited Too sandy	0.87	Not limited	
ICGD3: Ironmound-----	40	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
Coyle-----	30	Not limited		Not limited		Somewhat limited Depth to bedrock	0.10
Grainola-----	15	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.16 0.05
IrCE: Ironmound-----	53	Not limited		Not limited		Very limited Depth to bedrock Droughty Slope	1.00 0.97 0.16
Coyle-----	22	Not limited		Not limited		Somewhat limited Depth to bedrock Slope	0.80 0.16
IroC2: Ironmound-----	90	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 0.71
KgfbB: Kingfisher-----	90	Not limited		Not limited		Somewhat limited Depth to bedrock	0.01
KinC2: Kingfisher-----	90	Not limited		Not limited		Somewhat limited Depth to bedrock	0.71
KonB, KonD2: Konawa-----	96	Somewhat limited Too sandy	0.96	Somewhat limited Too sandy	0.96	Not limited	
KrdA, KrkB: Kirkland-----	90	Not limited		Not limited		Not limited	
LarA: Lawrie-----	94	Not limited		Not limited		Somewhat limited Flooding	0.60
LawA: Lawrie-----	86	Not limited		Not limited		Not limited	
LerA: Lebron-----	80	Very limited Depth to saturated zone Too clayey Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Ponding Flooding	1.00 1.00 1.00 0.60

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LitB, LitC2: Littleaxe-----	80	Not limited		Not limited		Not limited	
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Very limited Depth to bedrock Droughty Slope	1.00 0.73 0.37
Ironmound-----	27	Not limited		Not limited		Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.16
MaIG: Masham-----	73	Very limited Water erosion Slope	1.00 1.00	Very limited Water erosion Slope	1.00 0.56	Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Ironmound-----	17	Somewhat limited Slope	0.92	Not limited		Very limited Depth to bedrock Slope Droughty	1.00 1.00 0.85
MinB, MinC, MinD: Minco-----	91	Not limited		Not limited		Not limited	
MinF: Minco-----	91	Very limited Water erosion Slope	1.00 0.32	Very limited Water erosion	1.00	Very limited Slope	1.00
M11A: Miller-----	95	Somewhat limited Too clayey	0.50	Somewhat limited Too clayey	0.50	Very limited Too clayey Flooding	1.00 0.60
MulC, MulC2: Mulhall-----	88	Not limited		Not limited		Not limited	
NavA, NavB: Navina-----	96	Not limited		Not limited		Not limited	
NeGD4: Newalla-----	75	Not limited		Not limited		Not limited	
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Not limited		Not limited		Not limited	
NorA: Norge-----	93	Not limited		Not limited		Not limited	
NorB: Norge-----	90	Not limited		Not limited		Not limited	

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NorC2: Norge-----	88	Not limited		Not limited		Not limited	
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Not limited		Not limited		Very limited Sodium content	1.00
						Droughty	0.04
						Salinity	0.01
PieB: Piedmont-----	92	Not limited		Not limited		Somewhat limited Depth to bedrock	0.29
PieC2: Piedmont-----	93	Not limited		Not limited		Somewhat limited Depth to bedrock	0.71
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA: Pulaski-----	85	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
PulA: Pulaski-----	85	Not limited		Not limited		Somewhat limited Flooding	0.60
RenB, RenC: Renfrow-----	89	Not limited		Not limited		Not limited	
RewC2: Renfrow-----	84	Not limited		Not limited		Not limited	
RinB: Renthin-----	81	Not limited		Not limited		Not limited	
RnnC2: Renthin-----	80	Not limited		Not limited		Not limited	
SDGD4: Stephenville-----	32	Not limited		Not limited		Somewhat limited Depth to bedrock	0.97
						Droughty	0.10
						Content of large stones	0.03
Darsil-----	31	Somewhat limited Too sandy	0.34	Somewhat limited Too sandy	0.34	Very limited Depth to bedrock	1.00
						Droughty	1.00
Gullied land-----	23	Not rated		Not rated		Not rated	

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND: Stephenville-----	44	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.65 0.03
Darsil-----	29	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
Newalla-----	21	Not limited		Not limited		Not limited	
SDND2: Stephenville-----	44	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.46 0.03
Darsil-----	33	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
Newalla-----	20	Not limited		Not limited		Not limited	
SlaB, SlaD: Slaughterville-----	95	Not limited		Not limited		Not limited	
SlaF: Slaughterville-----	95	Not limited		Not limited		Somewhat limited Slope	0.96
StDC: Stephenville-----	55	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.46 0.03
Darsil-----	30	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
StDC2: Stephenville-----	55	Not limited		Not limited		Somewhat limited Content of large stones Depth to bedrock	0.03 0.01
Darsil-----	30	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
StDE: Stephenville-----	50	Not limited		Not limited		Somewhat limited Slope Depth to bedrock Content of large stones	0.96 0.71 0.03
Darsil-----	40	Somewhat limited Too sandy	0.34	Somewhat limited Too sandy	0.34	Very limited Depth to bedrock Droughty	1.00 1.00

## Recreational Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SteB: Stephenville-----	94	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.10 0.03
SteC2: Stephenville-----	92	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.54 0.03
SUND: Stephenville-----	35	Not limited		Not limited		Somewhat limited Depth to bedrock Content of large stones	0.65 0.03
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Not limited		Not limited		Not limited	
TelB, TelC2: Teller-----	96	Not limited		Not limited		Not limited	
TriA: Tribbey-----	90	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding Depth to saturated zone	1.00 0.19
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Not limited		Not limited		Somewhat limited Flooding	0.60
ZaHC: Zaneis-----	55	Not limited		Not limited		Not limited	
Huska-----	25	Not limited		Not limited		Very limited Sodium content Droughty Salinity	1.00 0.11 0.01
ZanB, ZanC, ZanC2: Zaneis-----	87	Not limited		Not limited		Not limited	

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for sanitary facilities, waste management, building site development, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

## Sanitary Facilities

The tables "Sanitary Facilities, Part I" and "Sanitary Facilities, Part II" show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses.

*Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

*Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

*Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil below a depth of 24 inches and a restrictive feature is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

*Trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented

pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed. Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill. Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse. The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

*Area sanitary landfill* is an area where solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan. Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime. Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion. Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area. After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.



## Sanitary Facilities, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AspA, AstA: Ashport-----	95	Very limited Flooding Restricted permeability	1.00 0.46	Very limited Flooding Seepage	1.00 0.53
BetA, BetB: Bethany-----	93	Very limited Restricted permeability	1.00	Not limited	
BocA: Bocox-----	94	Very limited Depth to saturated zone Filtering capacity Ponding Restricted permeability	1.00 1.00 1.00 0.46	Very limited Seepage Depth to saturated zone Ponding	1.00 1.00 1.00
Bt1A: Bathel-----	94	Very limited Ponding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited Ponding Seepage Depth to saturated zone	1.00 1.00 1.00
CaaA: Canadian-----	94	Very limited Filtering capacity Flooding	1.00 0.40	Very limited Seepage Flooding	1.00 0.40
CAID: Coyle-----	31	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
Ashport-----	28	Very limited Flooding Restricted permeability	1.00 0.46	Very limited Flooding Seepage	1.00 0.53
Ironmound-----	22	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
CoIC2: Coyle-----	61	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
Ironmound-----	33	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
CoUB: Coyle-----	55	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage	1.00 0.53
Urban land-----	40	Not rated		Not rated	
CoUC: Coyle-----	42	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.08
Urban land-----	38	Not rated		Not rated	
CoyB: Coyle-----	91	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage	1.00 0.53
CoyC2: Coyle-----	91	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
CoZC3: Coyle-----	70	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
Zaneis-----	15	Very limited Restricted permeability Depth to bedrock	1.00 0.89	Somewhat limited Depth to soft bedrock Seepage Slope	0.71 0.53 0.32
DAM: Dam-----	100	Not rated		Not rated	

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
DerB: Derby-----	90	Very limited Filtering capacity	1.00	Very limited Seepage	1.00
DerD: Derby-----	90	Very limited Filtering capacity	1.00	Very limited Seepage Slope	1.00 0.92
DerE: Derby-----	90	Very limited Filtering capacity Slope	1.00 0.63	Very limited Slope Seepage	1.00 1.00
DiRG: Darsil-----	67	Very limited Depth to bedrock Slope Restricted permeability	1.00 1.00 0.72	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated	
DouB: Dougherty-----	91	Somewhat limited Restricted permeability	0.46	Very limited Seepage	1.00
DouD: Dougherty-----	91	Somewhat limited Restricted permeability	0.46	Very limited Seepage Slope	1.00 0.92
DUM: Dumps-----	100	Not rated		Not rated	
EasA: Easpur-----	93	Very limited Flooding Restricted permeability	1.00 0.46	Very limited Flooding Seepage	1.00 0.53
GadA: Gaddy-----	85	Very limited Flooding Filtering capacity	1.00 1.00	Very limited Flooding Seepage	1.00 1.00
GaGA: Gaddy-----	67	Very limited Flooding Filtering capacity	1.00 1.00	Very limited Flooding Seepage	1.00 1.00

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
GaGA: Gracemore-----	23	Very limited Flooding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
GMGE4: Grainola-----	40	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
Masham-----	30	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
Gullied land-----	20	Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
Masham-----	22	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
Lucien-----	21	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
GohC: Goodnight-----	92	Very limited Filtering capacity	1.00	Very limited Seepage Slope	1.00 0.08
GohE: Goodnight-----	92	Very limited Filtering capacity Slope	1.00 0.16	Very limited Seepage Slope	1.00 1.00
GooE: Goodnight-----	92	Very limited Filtering capacity	1.00	Very limited Seepage Slope	1.00 1.00

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
GooG: Goodnight-----	92	Very limited Filtering capacity Slope	1.00 1.00	Very limited Slope Seepage	1.00 1.00
GraC: Grainola-----	88	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 0.32
GraD2: Grainola-----	89	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
GrHC: Grant-----	45	Very limited Restricted permeability Depth to bedrock	1.00 0.59	Somewhat limited Seepage Slope Depth to soft bedrock	0.53 0.32 0.13
Huska-----	35	Very limited Restricted permeability Depth to bedrock	1.00 0.78	Somewhat limited Depth to soft bedrock Slope	0.42 0.08
GrIE: Grainola-----	71	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
Ironmound-----	20	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
GrLE: Grainola-----	55	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.04	Very limited Depth to soft bedrock Slope	1.00 1.00
Lucien-----	26	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to soft bedrock Slope	1.00 1.00
HaGD4: Harrah-----	70	Somewhat limited Restricted permeability	0.46	Very limited Slope Seepage	1.00 0.53
Gullied land-----	15	Not rated		Not rated	

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
HarC: Harrah-----	91	Somewhat limited Restricted permeability	0.46	Very limited Seepage Slope	1.00 0.32
HarC2: Harrah-----	91	Somewhat limited Restricted permeability	0.46	Somewhat limited Seepage Slope	0.53 0.32
HarG: Harrah-----	86	Very limited Slope Restricted permeability	1.00 0.46	Very limited Slope Seepage	1.00 0.53
HawB: Hawley-----	94	Somewhat limited Restricted permeability Flooding	0.46 0.40	Very limited Seepage Flooding	1.00 0.40
ICGD3: Ironmound-----	40	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
Coyle-----	30	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
Grainola-----	15	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
IrCE: Ironmound-----	53	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
Coyle-----	22	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.16	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
IroC2: Ironmound-----	90	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
KgfB: Kingfisher-----	90	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock	1.00
KinC2: Kingfisher-----	90	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 0.32
KonB: Konawa-----	96	Not limited		Very limited Seepage	1.00
KonD2: Konawa-----	96	Not limited		Very limited Seepage Slope	1.00 0.92
KrdA, KrkB: Kirkland-----	90	Very limited Restricted permeability	1.00	Not limited	
LarA: Lawrie-----	94	Very limited Flooding Restricted permeability	1.00 0.46	Very limited Flooding Seepage	1.00 0.53
LawA: Lawrie-----	86	Somewhat limited Restricted permeability Flooding	0.46 0.40	Somewhat limited Seepage Flooding	0.53 0.40
LerA: Lebron-----	80	Very limited Flooding Depth to saturated zone Filtering capacity Restricted permeability Ponding	1.00 1.00 1.00 1.00 1.00	Very limited Flooding Seepage Ponding	1.00 1.00 1.00
LitB: Littleaxe-----	80	Somewhat limited Restricted permeability Depth to bedrock	0.72 0.36	Very limited Seepage Depth to soft bedrock	1.00 0.01
LitC2: Littleaxe-----	80	Somewhat limited Restricted permeability Depth to bedrock	0.72 0.69	Very limited Seepage Slope Depth to soft bedrock	1.00 0.32 0.26

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
M-W: Miscellaneous water-	100	Not rated		Not rated	
MaID: Masham-----	52	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.37	Very limited Depth to soft bedrock Slope	1.00 1.00
Ironmound-----	27	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
MaIG: Masham-----	73	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
Ironmound-----	17	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
MinB: Minco-----	91	Somewhat limited Restricted permeability	0.46	Somewhat limited Seepage	0.53
MinC: Minco-----	91	Somewhat limited Restricted permeability	0.46	Somewhat limited Seepage Slope	0.53 0.32
MinD: Minco-----	91	Somewhat limited Restricted permeability	0.46	Very limited Slope Seepage	1.00 0.53
MinF: Minco-----	91	Very limited Slope Restricted permeability	1.00 0.46	Very limited Slope Seepage	1.00 0.53
M11A: Miller-----	95	Very limited Flooding Restricted permeability	1.00 1.00	Very limited Flooding	1.00
Mu1C: Mulhall-----	88	Very limited Restricted permeability Depth to bedrock	1.00 0.01	Somewhat limited Seepage Slope	0.53 0.32



## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
MulC2: Mulhall-----	88	Very limited Restricted permeability	1.00	Somewhat limited Seepage Slope	0.53 0.32
NavA, NavB: Navina-----	96	Somewhat limited Restricted permeability	0.46	Somewhat limited Seepage	0.53
NeGD4: Newalla-----	75	Very limited Restricted permeability Depth to bedrock	1.00 0.91	Somewhat limited Depth to soft bedrock Slope	0.77 0.68
Gullied land-----	15	Not rated		Not rated	
NewB: Newalla-----	90	Very limited Restricted permeability Depth to bedrock	1.00 0.91	Somewhat limited Depth to soft bedrock Seepage	0.77 0.53
NorA: Norge-----	93	Very limited Restricted permeability	1.00	Somewhat limited Seepage	0.53
NorB: Norge-----	90	Very limited Restricted permeability	1.00	Somewhat limited Seepage	0.28
NorC2: Norge-----	88	Very limited Restricted permeability	1.00	Somewhat limited Slope	0.32
OWHD: Oil waste land-----	50	Not rated		Not rated	
Huska-----	30	Very limited Restricted permeability Depth to bedrock	1.00 0.30	Not limited	
PieB: Piedmont-----	92	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock	1.00
PieC2: Piedmont-----	93	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope	1.00 0.32
PIT: Pits-----	100	Not rated		Not rated	

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
PukA, Pula: Pulaski-----	85	Very limited Flooding	1.00	Very limited Flooding Seepage	1.00 1.00
RenB: Renfrow-----	89	Very limited Restricted permeability	1.00	Not limited	
RenC: Renfrow-----	89	Very limited Restricted permeability Depth to bedrock	1.00 0.04	Somewhat limited Slope	0.32
RewC2: Renfrow-----	84	Very limited Restricted permeability Depth to bedrock	1.00 0.14	Somewhat limited Slope	0.32
RinB: Renthin-----	81	Very limited Restricted permeability Depth to bedrock	1.00 0.59	Somewhat limited Depth to soft bedrock	0.13
RnnC2: Renthin-----	80	Very limited Restricted permeability Depth to bedrock	1.00 0.78	Somewhat limited Depth to soft bedrock Slope	0.42 0.32
SDGD4: Stephenville-----	32	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
Darsil-----	31	Very limited Depth to bedrock Restricted permeability	1.00 0.72	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.28
Gullied land-----	23	Not rated		Not rated	
SDND: Stephenville-----	44	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 1.00
Darsil-----	29	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 1.00

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
SDND: Newalla-----	21	Very limited Restricted permeability Depth to bedrock	1.00 0.86	Very limited Slope Depth to soft bedrock Seepage	1.00 0.61 0.53
SDND2: Stephenville-----	44	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
Darsil-----	33	Very limited Depth to bedrock Restricted permeability	1.00 0.72	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.28
Newalla-----	20	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
SlaB: Slaughterville-----	95	Very limited Filtering capacity	1.00	Very limited Seepage	1.00
SlaD: Slaughterville-----	95	Very limited Filtering capacity	1.00	Very limited Seepage Slope	1.00 1.00
SlaF: Slaughterville-----	95	Very limited Filtering capacity Slope	1.00 0.96	Very limited Slope Seepage	1.00 1.00
StDC: Stephenville-----	55	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 0.32
Darsil-----	30	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 0.08
StDC2: Stephenville-----	55	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.08

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
StDC2: Darsil-----	30	Very limited Depth to bedrock Restricted permeability	1.00 0.72	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 0.08
StDE: Stephenville-----	50	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00 0.96	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
Darsil-----	40	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 1.00
SteB: Stephenville-----	94	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Seepage	1.00 0.53
SteC2: Stephenville-----	92	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 0.53 0.32
SUND: Stephenville-----	35	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 0.53
Urban land-----	30	Not rated		Not rated	
Newalla-----	15	Very limited Restricted permeability Depth to bedrock	1.00 0.36	Very limited Slope Depth to soft bedrock	1.00 0.01
TelB: Teller-----	96	Somewhat limited Restricted permeability	0.46	Very limited Seepage	1.00
TelC2: Teller-----	96	Somewhat limited Restricted permeability	0.46	Very limited Seepage Slope	1.00 0.32

## Sanitary Facilities, Part I-Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
TriA: Tribbey-----	90	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
URB: Urban land-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Flooding	1.00	Very limited Flooding Seepage	1.00 1.00
ZaHC: Zaneis-----	55	Very limited Restricted permeability Depth to bedrock	1.00 0.69	Somewhat limited Seepage Slope Depth to soft bedrock	0.53 0.32 0.26
Huska-----	25	Very limited Restricted permeability Depth to bedrock	1.00 0.30	Somewhat limited Slope	0.32
ZanB: Zaneis-----	87	Very limited Restricted permeability Depth to bedrock	1.00 0.96	Somewhat limited Depth to soft bedrock Seepage	0.88 0.53
ZanC: Zaneis-----	87	Very limited Restricted permeability Depth to bedrock	1.00 0.89	Somewhat limited Depth to soft bedrock Seepage Slope	0.71 0.53 0.32
ZanC2: Zaneis-----	87	Very limited Restricted permeability Depth to bedrock	1.00 0.47	Somewhat limited Seepage Slope Depth to soft bedrock	0.53 0.32 0.05

## Sanitary Facilities, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
AstA: Ashport-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
BetA, BetB: Bethany-----	93	Very limited Too clayey	1.00	Not limited		Very limited Too clayey Hard to compact	1.00 1.00
BocA: Bocox-----	94	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Seepage Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
Bt1A: Bathel-----	94	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Ponding Seepage Depth to saturated zone	1.00 1.00 0.24
CaaA: Canadian-----	94	Very limited Seepage Flooding	1.00 0.40	Very limited Seepage Flooding	1.00 0.40	Very limited Seepage	1.00
CAID: Coyle-----	31	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Ashport-----	28	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
Ironmound-----	22	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
CoIC2: Coyle-----	61	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Ironmound-----	33	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
CoUB: Coyle-----	55	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Urban land-----	40	Not rated		Not rated		Not rated	

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoUC: Coyle-----	42	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB, CoyC2: Coyle-----	91	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
CoZC3: Coyle-----	70	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Zaneis-----	15	Very limited Depth to bedrock Too clayey	1.00 0.50	Somewhat limited Depth to bedrock	0.71	Somewhat limited Depth to bedrock Too clayey	0.71 0.50
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
DerD: Derby-----	90	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage	1.00 1.00
DerE: Derby-----	90	Very limited Seepage Too sandy Slope	1.00 1.00 0.63	Very limited Seepage Slope	1.00 0.63	Very limited Too sandy Seepage Slope	1.00 1.00 0.63
DiRG: Darsil-----	67	Very limited Slope Depth to bedrock Seepage	1.00 1.00 1.00	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Slope	1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Very limited Seepage	1.00	Very limited Seepage	1.00	Not limited	
DouD: Dougherty-----	91	Very limited Seepage	1.00	Very limited Seepage	1.00	Somewhat limited Seepage	0.52
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GadA: Gaddy-----	85	Very limited Flooding Seepage Too sandy	1.00 1.00 1.00	Very limited Flooding Seepage	1.00 1.00	Very limited Too sandy Seepage	1.00 1.00
GaGA: Gaddy-----	67	Very limited Flooding Seepage Too sandy	1.00 1.00 1.00	Very limited Flooding Seepage	1.00 1.00	Very limited Too sandy Seepage	1.00 1.00
Gracemore-----	23	Very limited Flooding Depth to saturated zone Seepage Too sandy	1.00 1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
GMGE4: Grainola-----	40	Very limited Depth to bedrock Too clayey Slope	1.00 1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Too clayey Hard to compact Slope	1.00 1.00 1.00 0.16
Masham-----	30	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Hard to compact Slope	1.00 1.00 0.16
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Depth to bedrock Too clayey Slope	1.00 1.00 1.00	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to bedrock Too clayey Hard to compact Slope Gravel content	1.00 1.00 1.00 1.00 0.07
Masham-----	22	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Slope Hard to compact	1.00 1.00 1.00
Lucien-----	21	Very limited Slope Depth to bedrock Seepage	1.00 1.00 1.00	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Slope	1.00 1.00
GohC: Goodnight-----	92	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage	1.00 1.00
GohE: Goodnight-----	92	Very limited Seepage Too sandy Slope	1.00 1.00 0.16	Very limited Seepage Slope	1.00 0.16	Very limited Too sandy Seepage Slope	1.00 1.00 0.16



## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GooE: Goodnight-----	92	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage	1.00 1.00
GooG: Goodnight-----	92	Very limited Slope Seepage Too sandy	1.00 1.00 1.00	Very limited Slope Seepage	1.00 1.00	Very limited Slope Too sandy Seepage	1.00 1.00 1.00
GraC: Grainola-----	88	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Hard to compact	1.00 1.00
GraD2: Grainola-----	89	Very limited Depth to bedrock Too clayey	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact	1.00 1.00 1.00
GrHC: Grant-----	45	Very limited Depth to bedrock Too clayey	1.00 0.50	Somewhat limited Depth to bedrock	0.14	Somewhat limited Too clayey Depth to bedrock	0.50 0.14
Huska-----	35	Very limited Depth to bedrock Sodium content Too clayey	1.00 1.00 1.00	Somewhat limited Depth to bedrock	0.42	Very limited Sodium content Too clayey Hard to compact Depth to bedrock	1.00 1.00 1.00 0.42
GrIE: Grainola-----	71	Very limited Depth to bedrock Too clayey	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact	1.00 1.00 1.00
Ironmound-----	20	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
GrLE: Grainola-----	55	Very limited Depth to bedrock Too clayey Slope	1.00 1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Too clayey Hard to compact Slope	1.00 1.00 1.00 0.04
Lucien-----	26	Very limited Depth to bedrock Seepage Slope	1.00 1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04
HaGD4: Harrah-----	70	Not limited		Not limited		Not limited	
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Not limited		Not limited		Not limited	

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HarG: Harrah-----	86	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
HawB: Hawley-----	94	Very limited Too sandy Seepage Flooding	1.00 1.00 0.40	Somewhat limited Flooding	0.40	Somewhat limited Too sandy Seepage	0.50 0.22
ICGD3: Ironmound-----	40	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Coyle-----	30	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Grainola-----	15	Very limited Depth to bedrock Too clayey	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact	1.00 1.00 1.00
IrCE: Ironmound-----	53	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16
Coyle-----	22	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16
IroC2: Ironmound-----	90	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
KgfbB: Kingfisher-----	90	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
KinC2: Kingfisher-----	90	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Hard to compact	1.00 1.00
KonB: Konawa-----	96	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Somewhat limited Seepage Too sandy	0.52 0.50
KonD2: Konawa-----	96	Very limited Seepage	1.00	Very limited Seepage	1.00	Somewhat limited Seepage	0.52
KrdA, KrkB: Kirkland-----	90	Very limited Too clayey	1.00	Not limited		Very limited Too clayey Hard to compact	1.00 1.00

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LarA: Lawrie-----	94	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
LawA: Lawrie-----	86	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Somewhat limited Too clayey	0.50
LerA: Lebron-----	80	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00	Ponding	1.00
		Too sandy	1.00	Ponding	1.00	Too sandy	0.50
		Ponding	1.00				
LitB: Littleaxe-----	80	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.01	Somewhat limited Depth to bedrock	0.01
		Seepage	1.00				
LitC2: Littleaxe-----	80	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.26	Somewhat limited Depth to bedrock	0.26
		Seepage	1.00				
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Hard to compact Slope	1.00 0.37
Ironmound-----	27	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
		Slope	0.16	Slope	0.16	Slope	0.16
MaIG: Masham-----	73	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
						Hard to compact	1.00
Ironmound-----	17	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
MinB, MinC, MinD: Minco-----	91	Not limited		Not limited		Not limited	
MinF: Minco-----	91	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
M11A: Miller-----	95	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MulC: Mulhall-----	88	Very limited Depth to bedrock	1.00	Not limited		Not limited	
MulC2: Mulhall-----	88	Not limited		Not limited		Not limited	
NavA, NavB: Navina-----	96	Very limited Seepage	1.00	Not limited		Not limited	
NeGD4: Newalla-----	75	Very limited Depth to bedrock Too clayey	1.00 1.00	Somewhat limited Depth to bedrock	0.77	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.77
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Very limited Depth to bedrock Too clayey	1.00 1.00	Somewhat limited Depth to bedrock	0.77	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.77
NorA: Norge-----	93	Somewhat limited Too clayey	0.50	Not limited		Somewhat limited Too clayey	0.50
NorB: Norge-----	90	Somewhat limited Too clayey	0.50	Not limited		Somewhat limited Too clayey	0.50
NorC2: Norge-----	88	Somewhat limited Too clayey	0.50	Not limited		Somewhat limited Too clayey	0.50
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Depth to bedrock Sodium content Too clayey	1.00 1.00 1.00	Not limited		Very limited Sodium content Too clayey Hard to compact	1.00 1.00 1.00
PieB: Piedmont-----	92	Very limited Depth to bedrock Too clayey	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact	1.00 1.00 1.00
PieC2: Piedmont-----	93	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Hard to compact	1.00 1.00
PIT: Pits-----	100	Not rated		Not rated		Not rated	

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PukA, Pula: Pulaski-----	85	Very limited Flooding Seepage Too sandy	1.00 1.00 1.00	Very limited Flooding Seepage	1.00 1.00	Somewhat limited Seepage Too sandy	0.52 0.50
RenB: Renfrow-----	89	Very limited Too clayey	1.00	Not limited		Very limited Too clayey Hard to compact	1.00 1.00
RenC: Renfrow-----	89	Very limited Depth to bedrock Too clayey	1.00 1.00	Not limited		Very limited Too clayey Hard to compact	1.00 1.00
RewC2: Renfrow-----	84	Very limited Depth to bedrock Too clayey	1.00 1.00	Not limited		Very limited Too clayey Hard to compact	1.00 1.00
RinB: Renthin-----	81	Very limited Depth to bedrock Too clayey	1.00 1.00	Somewhat limited Depth to bedrock	0.14	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.14
RnnC2: Renthin-----	80	Very limited Depth to bedrock Too clayey	1.00 1.00	Somewhat limited Depth to bedrock	0.42	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.42
SDGD4: Stephenville-----	32	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Darsil-----	31	Very limited Depth to bedrock Seepage	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Darsil-----	29	Very limited Depth to bedrock Seepage Too sandy	1.00 1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Seepage Too sandy	1.00 1.00 0.50
Newalla-----	21	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.61	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.61

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND2: Stephenville-----	44	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Darsil-----	33	Very limited Depth to bedrock Seepage	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Newalla-----	20	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	1.00	Very limited Hard to compact Depth to bedrock	1.00 1.00
SlaB: Slaughterville-----	95	Very limited Seepage	1.00	Very limited Seepage	1.00	Somewhat limited Seepage	0.52
SlaD: Slaughterville-----	95	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
SlaF: Slaughterville-----	95	Very limited Seepage Slope	1.00 0.96	Very limited Seepage Slope	1.00 0.96	Somewhat limited Slope Seepage	0.96 0.52
StDC: Stephenville-----	55	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Darsil-----	30	Very limited Depth to bedrock Seepage	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Seepage	1.00 1.00
StDC2: Stephenville-----	55	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Darsil-----	30	Very limited Depth to bedrock Seepage	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
StDE: Stephenville-----	50	Very limited Depth to bedrock Slope	1.00 0.96	Very limited Depth to bedrock Slope	1.00 0.96	Very limited Depth to bedrock Slope	1.00 0.96
Darsil-----	40	Very limited Depth to bedrock Seepage Too sandy	1.00 1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Seepage Too sandy	1.00 1.00 0.50
SteB: Stephenville-----	94	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
SteC2: Stephenville-----	92	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00

## Sanitary Facilities, Part II--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SUND: Stephenville-----	35	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Very limited Depth to bedrock Too clayey	1.00 1.00	Somewhat limited Depth to bedrock	0.01	Very limited Too clayey Hard to compact Depth to bedrock	1.00 1.00 0.01
TelB: Teller-----	96	Very limited Seepage Too clayey	1.00 0.50	Not limited		Somewhat limited Seepage Too clayey	0.52 0.50
TelC2: Teller-----	96	Somewhat limited Too clayey	0.50	Very limited Seepage	1.00	Somewhat limited Too clayey	0.50
TriA: Tribbey-----	90	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Somewhat limited Depth to saturated zone Seepage	0.86 0.52
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Flooding Seepage	1.00 1.00	Very limited Flooding Seepage	1.00 1.00	Somewhat limited Seepage	0.52
ZaHC: Zaneis-----	55	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.26	Somewhat limited Depth to bedrock	0.26
Huska-----	25	Very limited Depth to bedrock Sodium content Too clayey	1.00 1.00 0.50	Not limited		Very limited Sodium content Hard to compact Too clayey	1.00 1.00 0.50
ZanB: Zaneis-----	87	Very limited Depth to bedrock Too clayey	1.00 0.50	Somewhat limited Depth to bedrock	0.88	Somewhat limited Depth to bedrock Too clayey	0.88 0.50
ZanC: Zaneis-----	87	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.71	Somewhat limited Depth to bedrock	0.71
ZanC2: Zaneis-----	87	Very limited Depth to bedrock	1.00	Somewhat limited Depth to bedrock	0.05	Somewhat limited Depth to bedrock	0.05

## Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The tables “Building Site Development, Part I” and “Building Site Development, Part II” show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping. The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development.

*Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

*Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

*Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are



based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

## Building Site Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
AstA: Ashport-----	90	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
BetA: Bethany-----	93	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
BetB: Bethany-----	93	Somewhat limited Shrink-swell	0.50	Very limited Shrink-swell	1.00	Somewhat limited Shrink-swell	0.50
BocA: Bocox-----	94	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
Bt1A: Bathel-----	94	Very limited Ponding Shrink-swell	1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 0.99	Very limited Ponding Shrink-swell	1.00 0.50
CaaA: Canadian-----	94	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
CAID: Coyle-----	31	Not limited		Somewhat limited Depth to soft bedrock	0.06	Not limited	
Ashport-----	28	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
Ironmound-----	22	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
CoIC2: Coyle-----	61	Not limited		Somewhat limited Depth to soft bedrock	0.03	Not limited	
Ironmound-----	33	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock	1.00

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoUB: Coyle-----	55	Not limited		Somewhat limited Depth to soft bedrock	0.97	Not limited	
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Not limited		Somewhat limited Depth to soft bedrock	0.54	Not limited	
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Not limited		Somewhat limited Depth to soft bedrock	0.35	Not limited	
CoyC2: Coyle-----	91	Not limited		Somewhat limited Depth to soft bedrock	0.71	Not limited	
CoZC3: Coyle-----	70	Not limited		Somewhat limited Depth to soft bedrock	0.35	Not limited	
Zaneis-----	15	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Not limited		Not limited		Not limited	
DerD: Derby-----	90	Not limited		Not limited		Somewhat limited Slope	0.50
DerE: Derby-----	90	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
DiRG: Darsil-----	67	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Not limited		Not limited		Not limited	
DouD: Dougherty-----	91	Not limited		Not limited		Somewhat limited Slope	0.50

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpor-----	93	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
GadA: Gaddy-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
GaGA: Gaddy-----	67	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Gracemore-----	23	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00
GMGE4: Grainola-----	40	Very limited Shrink-swell Slope	1.00 0.16	Very limited Shrink-swell Slope Depth to soft bedrock	1.00 0.16 0.01	Very limited Shrink-swell Slope	1.00 1.00
Masham-----	30	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Shrink-swell Slope	1.00 1.00	Very limited Shrink-swell Slope Depth to soft bedrock	1.00 1.00 0.46	Very limited Shrink-swell Slope	1.00 1.00
Masham-----	22	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
Lucien-----	21	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
GohC: Goodnight-----	92	Not limited		Not limited		Not limited	
GohE: Goodnight-----	92	Somewhat limited Slope	0.16	Somewhat limited Slope	0.16	Very limited Slope	1.00
GooE: Goodnight-----	92	Not limited		Not limited		Very limited Slope	1.00

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GooG: Goodnight-----	92	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
GraC: Grainola-----	88	Very limited Shrink-swell	1.00	Somewhat limited Depth to soft bedrock	0.29	Very limited Shrink-swell	1.00
GraD2: Grainola-----	89	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.01	Very limited Shrink-swell Slope	1.00 0.88
GrHC: Grant-----	45	Not limited		Not limited		Not limited	
Huska-----	35	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
GrIE: Grainola-----	71	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.01	Very limited Shrink-swell Slope	1.00 1.00
Ironmound-----	20	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
GrLE: Grainola-----	55	Very limited Shrink-swell Slope	1.00 0.04	Very limited Shrink-swell Depth to soft bedrock Slope	1.00 0.74 0.04	Very limited Shrink-swell Slope	1.00 1.00
Lucien-----	26	Somewhat limited Depth to soft bedrock Slope	1.00 0.04	Very limited Depth to soft bedrock Slope	1.00 0.04	Very limited Depth to soft bedrock Slope	1.00 1.00
HaGD4: Harrah-----	70	Not limited		Not limited		Somewhat limited Slope	0.88
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Not limited		Not limited		Not limited	
HarG: Harrah-----	86	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
HawB: Hawley-----	94	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00

## Building Site Development, Part I-Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ICGD3: Ironmound-----	40	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
Coyle-----	30	Not limited		Somewhat limited Depth to soft bedrock	0.10	Somewhat limited Slope	0.88
Grainola-----	15	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.15	Very limited Shrink-swell Slope	1.00 0.88
IrCE: Ironmound-----	53	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
Coyle-----	22	Somewhat limited Slope	0.16	Somewhat limited Depth to soft bedrock Slope	0.79 0.16	Very limited Slope	1.00
IroC2: Ironmound-----	90	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock	1.00
Kgfb: Kingfisher-----	90	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell Depth to soft bedrock	0.50 0.01	Somewhat limited Shrink-swell	0.50
KinC2: Kingfisher-----	90	Not limited		Somewhat limited Depth to soft bedrock	0.71	Not limited	
KonB: Konawa-----	96	Not limited		Not limited		Not limited	
KonD2: Konawa-----	96	Not limited		Not limited		Somewhat limited Slope	0.50
KrdA, KrkB: Kirkland-----	90	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
LarA: Lawrie-----	94	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
LawA: Lawrie-----	86	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LerA: Lebron-----	80	Very limited Flooding Depth to saturated zone Ponding Shrink-swell	1.00 1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Ponding Shrink-swell	1.00 1.00 1.00 0.50
LitB, LitC2: Littleaxe-----	80	Not limited		Not limited		Not limited	
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Somewhat limited Depth to soft bedrock Slope	1.00 0.37	Very limited Depth to soft bedrock Slope	1.00 0.37	Very limited Depth to soft bedrock Slope	1.00 1.00
Ironmound-----	27	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Slope	1.00 1.00
MaIG: Masham-----	73	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
Ironmound-----	17	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Slope Depth to soft bedrock	1.00 1.00
MinB, MinC: Minco-----	91	Not limited		Not limited		Not limited	
MinD: Minco-----	91	Not limited		Not limited		Somewhat limited Slope	0.88
MinF: Minco-----	91	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
M11A: Miller-----	95	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00
MulC, MulC2: Mulhall-----	88	Not limited		Not limited		Not limited	
NavA, NavB: Navina-----	96	Not limited		Not limited		Not limited	

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NeGD4: Newalla-----	75	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.12
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
NorA: Norge-----	93	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
NorB: Norge-----	90	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
NorC2: Norge-----	88	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
PieB: Piedmont-----	92	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.29	Very limited Shrink-swell	1.00
PieC2: Piedmont-----	93	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.71	Very limited Shrink-swell	1.00
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA, Pula: Pulaski-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
RenB, RenC: Renfrow-----	89	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
RewC2: Renfrow-----	84	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
RinB: Renthin-----	81	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00



## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RnnC2: Renthin-----	80	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
SDGD4: Stephenville-----	32	Not limited		Somewhat limited Depth to soft bedrock	0.97	Somewhat limited Slope	0.88
Darsil-----	31	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Not limited		Somewhat limited Depth to soft bedrock	0.64	Somewhat limited Slope	0.88
Darsil-----	29	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
Newalla-----	21	Very limited Shrink-swell	1.00	Not limited		Very limited Shrink-swell Slope	1.00 0.88
SDND2: Stephenville-----	44	Not limited		Somewhat limited Depth to soft bedrock	0.46	Somewhat limited Slope	0.88
Darsil-----	33	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
Newalla-----	20	Very limited Shrink-swell	1.00	Not limited		Very limited Shrink-swell Slope	1.00 0.88
SlaB: Slaughterville-----	95	Not limited		Not limited		Not limited	
SlaD: Slaughterville-----	95	Not limited		Not limited		Somewhat limited Slope	0.88
SlaF: Slaughterville-----	95	Somewhat limited Slope	0.96	Somewhat limited Slope	0.96	Very limited Slope	1.00
StDC: Stephenville-----	55	Not limited		Somewhat limited Depth to soft bedrock	0.46	Not limited	

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
StDC: Darsil-----	30	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock	1.00
StDC2: Stephenville-----	55	Not limited		Somewhat limited Depth to soft bedrock	0.01	Not limited	
Darsil-----	30	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock	1.00
StDE: Stephenville-----	50	Somewhat limited Slope	0.96	Somewhat limited Slope Depth to soft bedrock	0.96 0.71	Very limited Slope	1.00
Darsil-----	40	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.88
SteB: Stephenville-----	94	Not limited		Somewhat limited Depth to soft bedrock	0.10	Not limited	
SteC2: Stephenville-----	92	Not limited		Somewhat limited Depth to soft bedrock	0.54	Not limited	
SUND: Stephenville-----	35	Not limited		Somewhat limited Depth to soft bedrock	0.64	Somewhat limited Slope	0.88
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.88
TelB, TelC2: Teller-----	96	Not limited		Not limited		Not limited	
TriA: Tribbey-----	90	Very limited Flooding Depth to saturated zone	1.00 0.39	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 0.39
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

## Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
YaaA, YahA: Yahola-----	87	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
ZaHC: Zaneis-----	55	Not limited		Not limited		Not limited	
Huska-----	25	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
ZanB: Zaneis-----	87	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
ZanC: Zaneis-----	87	Not limited		Somewhat limited Shrink-swell	0.50	Not limited	
ZanC2: Zaneis-----	87	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50

## Building Site Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Very limited Flooding Low strength Shrink-swell	1.00 1.00 0.50	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60
AstA: Ashport-----	90	Very limited Flooding Low strength Shrink-swell	1.00 1.00 0.50	Somewhat limited Flooding Cutbanks cave	0.80 0.10	Very limited Flooding	1.00
BetA: Bethany-----	93	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Cutbanks cave Too clayey	0.10 0.03	Not limited	
BetB: Bethany-----	93	Very limited Low strength Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave Too clayey	0.10 0.03	Not limited	
BocA: Bocox-----	94	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Cutbanks cave Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Droughty	1.00 1.00 0.01
Bt1A: Bathel-----	94	Very limited Ponding Shrink-swell	1.00 0.50	Very limited Ponding Depth to saturated zone Cutbanks cave	1.00 0.99 0.10	Very limited Ponding	1.00
CaaA: Canadian-----	94	Somewhat limited Flooding	0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
CAID: Coyle-----	31	Not limited		Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.06	Somewhat limited Depth to bedrock	0.06
Ashport-----	28	Very limited Flooding Low strength Shrink-swell	1.00 1.00 0.50	Very limited Cutbanks cave Flooding	1.00 0.80	Very limited Flooding	1.00

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CAID: Ironmound-----	22	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 0.46
CoIC2: Coyle-----	61	Not limited		Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.03	Somewhat limited Depth to bedrock	0.03
Ironmound-----	33	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 0.65
CoUB: Coyle-----	55	Not limited		Somewhat limited Depth to soft bedrock Dense layer Cutbanks cave	0.97 0.50 0.10	Somewhat limited Depth to bedrock Droughty	0.97 0.04
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.54 0.50 0.10	Somewhat limited Depth to bedrock	0.54
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Not limited		Somewhat limited Depth to dense layer Depth to soft bedrock Cutbanks cave	0.50 0.35 0.10	Somewhat limited Depth to bedrock	0.35
CoyC2: Coyle-----	91	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.71 0.50 0.10	Somewhat limited Depth to bedrock	0.71

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoZC3: Coyle-----	70	Not limited		Somewhat limited Depth to dense layer Depth to soft bedrock Cutbanks cave	0.50 0.35 0.10	Somewhat limited Depth to bedrock	0.35
Zaneis-----	15	Somewhat limited Shrink-swell	0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.14
DerD: Derby-----	90	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.27
DerE: Derby-----	90	Somewhat limited Slope	0.63	Very limited Cutbanks cave Slope	1.00 0.63	Somewhat limited Slope Droughty	0.63 0.25
DiRG: Darsil-----	67	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Depth to dense layer Cutbanks cave	1.00 1.00 0.50 0.10	Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB, DouD: Dougherty-----	91	Not limited		Very limited Cutbanks cave	1.00	Not limited	
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Very limited Flooding	1.00	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60
GadA: Gaddy-----	85	Very limited Flooding	1.00	Very limited Cutbanks cave Flooding	1.00 0.60	Somewhat limited Flooding Droughty	0.60 0.25
GaGA: Gaddy-----	67	Very limited Flooding	1.00	Very limited Cutbanks cave Flooding	1.00 0.80	Very limited Flooding Droughty	1.00 0.14

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GaGA: Gracemore-----	23	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Cutbanks cave Flooding	1.00 1.00 1.00 0.80	Very limited Flooding Depth to saturated zone	1.00 1.00
GMGE4: Grainola-----	40	Very limited Low strength Shrink-swell Slope	1.00 1.00 0.16	Very limited Cutbanks cave Depth to dense layer Too clayey Slope Depth to soft bedrock	1.00 0.50 0.28 0.16 0.01	Somewhat limited Slope Content of large stones Depth to bedrock	0.16 0.05 0.01
Masham-----	30	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Depth to dense layer Slope Cutbanks cave	1.00 0.50 0.16 0.10	Very limited Depth to bedrock Droughty Slope	1.00 0.71 0.16
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Shrink-swell Slope Low strength	1.00 1.00 1.00	Very limited Cutbanks cave Slope Depth to dense layer Depth to soft bedrock Too clayey	1.00 1.00 0.50 0.46 0.28	Very limited Slope Depth to bedrock Gravel content Content of large stones	1.00 0.46 0.24 0.08
Masham-----	22	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Depth to dense layer Cutbanks cave	1.00 1.00 0.50 0.10	Very limited Depth to bedrock Slope Droughty	1.00 1.00 0.97
Lucien-----	21	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Depth to dense layer Cutbanks cave	1.00 1.00 0.50 0.10	Very limited Depth to bedrock Slope Droughty Content of large stones	1.00 1.00 0.43 0.03
GohC: Goodnight-----	92	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.62
GohE: Goodnight-----	92	Somewhat limited Slope	0.16	Very limited Cutbanks cave Slope	1.00 0.16	Somewhat limited Droughty Slope	0.61 0.16

## Building Site Development, Part II--Continue=d

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GooE: Goodnight-----	92	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.81
GooG: Goodnight-----	92	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 1.00	Very limited Slope Droughty	1.00 0.85
GraC: Grainola-----	88	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Depth to dense layer Depth to soft bedrock Too clayey Cutbanks cave	0.50 0.29 0.28 0.10	Somewhat limited Depth to bedrock Content of large stones	0.29 0.05
GraD2: Grainola-----	89	Very limited Shrink-swell Low strength	1.00 1.00	Somewhat limited Depth to dense layer Too clayey Cutbanks cave Depth to soft bedrock	0.50 0.28 0.10 0.01	Somewhat limited Content of large stones Depth to bedrock	0.05 0.01
GrHC: Grant-----	45	Very limited Low strength	1.00	Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	
Huska-----	35	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Depth to dense layer Too clayey Cutbanks cave	0.50 0.28 0.10	Very limited Sodium content Droughty Salinity	1.00 0.08 0.01
GrIE: Grainola-----	71	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Dense layer Too clayey Cutbanks cave Depth to soft bedrock	0.50 0.28 0.10 0.01	Somewhat limited Content of large stones Depth to bedrock	0.05 0.01
Ironmound-----	20	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 0.74



## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrLE: Grainola-----	55	Very limited Shrink-swell Low strength Slope	1.00 1.00 0.04	Somewhat limited Depth to soft bedrock Depth to dense layer Too clayey Cutbanks cave Slope	0.74 0.50 0.28 0.10 0.04	Somewhat limited Depth to bedrock Content of large stones Slope	0.74 0.05 0.04
Lucien-----	26	Somewhat limited Depth to soft bedrock Slope	1.00 0.04	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave Slope	1.00 0.50 0.10 0.04	Very limited Depth to bedrock Droughty Slope Content of large stones	1.00 0.99 0.04 0.03
HaGD4: Harrah-----	70	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
HarG: Harrah-----	86	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
HawB: Hawley-----	94	Somewhat limited Flooding	0.40	Very limited Cutbanks cave	1.00	Not limited	
ICGD3: Ironmound-----	40	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
Coyle-----	30	Not limited		Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.10	Somewhat limited Depth to bedrock	0.10
Grainola-----	15	Very limited Shrink-swell Low strength	1.00 1.00	Somewhat limited Depth to dense layer Too clayey Depth to soft bedrock Cutbanks cave	0.50 0.28 0.15 0.10	Somewhat limited Depth to bedrock Content of large stones	0.16 0.05

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
IrCE: Ironmound-----	53	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Depth to dense layer Slope Cutbanks cave	1.00 0.50 0.16 0.10	Very limited Depth to bedrock Droughty Slope	1.00 0.97 0.16
Coyle-----	22	Somewhat limited Slope	0.16	Somewhat limited Depth to soft bedrock Depth to dense layer Slope Cutbanks cave	0.79 0.50 0.16 0.10	Somewhat limited Depth to bedrock Slope	0.80 0.16
IroC2: Ironmound-----	90	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 0.71
Kgfb: Kingfisher-----	90	Very limited Low strength Shrink-swell	1.00 0.50	Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.01	Somewhat limited Depth to bedrock	0.01
KinC2: Kingfisher-----	90	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.71 0.50 0.10	Somewhat limited Depth to bedrock	0.71
KonB: Konawa-----	96	Not limited		Very limited Cutbanks cave	1.00	Not limited	
KonD2: Konawa-----	96	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
KrdA, KrkB: Kirkland-----	90	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Cutbanks cave	0.50 0.10	Not limited	
LarA: Lawrie-----	94	Very limited Flooding Low strength Shrink-swell	1.00 1.00 0.50	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LawA: Lawrie-----	86	Very limited Low strength Shrink-swell Flooding	1.00 0.50 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
LerA: Lebron-----	80	Very limited Depth to saturated zone Flooding Ponding Shrink-swell	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Cutbanks cave Ponding Flooding	1.00 1.00 1.00 0.60	Very limited Depth to saturated zone Too clayey Ponding Flooding	1.00 1.00 1.00 0.60
LitB, LitC2: Littleaxe-----	80	Not limited		Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Somewhat limited Depth to soft bedrock Slope	1.00 0.37	Very limited Depth to soft bedrock Depth to dense layer Slope Cutbanks cave	1.00 0.50 0.37 0.10	Very limited Depth to bedrock Droughty Slope	1.00 0.73 0.37
Ironmound-----	27	Somewhat limited Depth to soft bedrock Slope	1.00 0.16	Very limited Depth to soft bedrock Depth to dense layer Slope Cutbanks cave	1.00 0.50 0.16 0.10	Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.16
MaIG: Masham-----	73	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Depth to dense layer Cutbanks cave	1.00 1.00 0.50 0.10	Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Ironmound-----	17	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Depth to dense layer Cutbanks cave	1.00 1.00 0.50 0.10	Very limited Depth to bedrock Slope Droughty	1.00 1.00 0.85
MinB, MinC, MinD: Minco-----	91	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MinF: Minco-----	91	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
M11A: Miller-----	95	Very limited Flooding Low strength Shrink-swell	1.00 1.00 1.00	Somewhat limited Flooding Too clayey Cutbanks cave	0.60 0.28 0.10	Very limited Too clayey Flooding	1.00 0.60
MulC, MulC2: Mulhall-----	88	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
NavA, NavB: Navina-----	96	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
NeGD4: Newalla-----	75	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Depth to dense layer Cutbanks cave	0.50 0.50 0.10	Not limited	
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Depth to dense layer Cutbanks cave	0.50 0.50 0.10	Not limited	
NorA: Norge-----	93	Very limited Low strength Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
NorB: Norge-----	90	Very limited Low strength Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
NorC2: Norge-----	88	Very limited Low strength Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Cutbanks cave	0.28 0.10	Very limited Sodium content Droughty Salinity	1.00 0.04 0.01

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PieB: Piedmont-----	92	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Depth to dense layer Depth to soft bedrock Too clayey Cutbanks cave	0.50 0.29 0.12 0.10	Somewhat limited Depth to bedrock	0.29
PieC2: Piedmont-----	93	Very limited Shrink-swell Low strength	1.00 1.00	Somewhat limited Depth to soft bedrock Depth to dense layer Too clayey Cutbanks cave	0.71 0.50 0.12 0.10	Somewhat limited Depth to bedrock	0.71
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA: Pulaski-----	85	Very limited Flooding	1.00	Very limited Cutbanks cave Flooding	1.00 0.80	Very limited Flooding	1.00
PulA: Pulaski-----	85	Very limited Flooding	1.00	Very limited Cutbanks cave Flooding	1.00 0.60	Somewhat limited Flooding	0.60
RenB, RenC: Renfrow-----	89	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
RewC2: Renfrow-----	84	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
RinB: Renthin-----	81	Very limited Shrink-swell Low strength	1.00 1.00	Somewhat limited Depth to dense layer Too clayey Cutbanks cave	0.50 0.12 0.10	Not limited	
RnnC2: Renthin-----	80	Very limited Low strength Shrink-swell	1.00 1.00	Very limited Cutbanks cave Depth to dense layer Too clayey	1.00 0.50 0.12	Not limited	

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDGD4: Stephenville-----	32	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.97 0.50 0.10	Somewhat limited Depth to bedrock Droughty Content of large stones	0.97 0.10 0.03
Darsil-----	31	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.64 0.50 0.10	Somewhat limited Depth to bedrock Content of large stones	0.65 0.03
Darsil-----	29	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
Newalla-----	21	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Depth to dense layer Cutbanks cave	0.50 0.50 0.10	Not limited	
SDND2: Stephenville-----	44	Not limited		Somewhat limited Depth to dense layer Depth to soft bedrock Cutbanks cave	0.50 0.46 0.10	Somewhat limited Depth to bedrock Content of large stones	0.46 0.03
Darsil-----	33	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
Newalla-----	20	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Depth to dense layer Cutbanks cave	0.50 0.50 0.10	Not limited	

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SlaB, SlaD: Slaughterville-----	95	Not limited		Very limited Cutbanks cave	1.00	Not limited	
SlaF: Slaughterville-----	95	Somewhat limited Slope	0.96	Very limited Cutbanks cave Slope	1.00 0.96	Somewhat limited Slope	0.96
StDC: Stephenville-----	55	Not limited		Somewhat limited Depth to dense layer Depth to soft bedrock Cutbanks cave	0.50 0.46 0.10	Somewhat limited Depth to bedrock Content of large stones	0.46 0.03
Darsil-----	30	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
StDC2: Stephenville-----	55	Not limited		Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.01	Somewhat limited Content of large stones Depth to bedrock	0.03 0.01
Darsil-----	30	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
StDE: Stephenville-----	50	Somewhat limited Slope	0.96	Somewhat limited Slope Depth to soft bedrock Depth to dense layer Cutbanks cave	0.96 0.71 0.50 0.10	Somewhat limited Slope Depth to bedrock Content of large stones	0.96 0.71 0.03
Darsil-----	40	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Depth to dense layer Cutbanks cave	1.00 0.50 0.10	Very limited Depth to bedrock Droughty	1.00 1.00

## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SteB: Stephenville-----	94	Not limited		Somewhat limited Depth to dense layer Cutbanks cave Depth to soft bedrock	0.50 0.10 0.10	Somewhat limited Depth to bedrock Content of large stones	0.10 0.03
SteC2: Stephenville-----	92	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.54 0.50 0.10	Somewhat limited Depth to bedrock Content of large stones	0.54 0.03
SUND: Stephenville-----	35	Not limited		Somewhat limited Depth to soft bedrock Depth to dense layer Cutbanks cave	0.64 0.50 0.10	Somewhat limited Depth to bedrock Content of large stones	0.65 0.03
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Too clayey Depth to dense layer	0.50 0.50	Not limited	
TelB, TelC2: Teller-----	96	Not limited		Somewhat limited Cutbanks cave	0.10	Not limited	
TriA: Tribbey-----	90	Very limited Flooding Depth to saturated zone	1.00 0.19	Very limited Depth to saturated zone Cutbanks cave Flooding	1.00 1.00 0.80	Very limited Flooding Depth to saturated zone	1.00 0.19
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Flooding	1.00	Very limited Cutbanks cave Flooding	1.00 0.60	Somewhat limited Flooding	0.60
ZaHC: Zaneis-----	55	Not limited		Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	



## Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZaHC: Huska-----	25	Very limited Low strength Shrink-swell	1.00 1.00	Somewhat limited Cutbanks cave	0.10	Very limited Sodium content Droughty Salinity	1.00 0.11 0.01
ZanB: Zaneis-----	87	Somewhat limited Shrink-swell	0.50	Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	
ZanC: Zaneis-----	87	Not limited		Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	
ZanC2: Zaneis-----	87	Somewhat limited Shrink-swell	0.50	Somewhat limited Depth to dense layer Cutbanks cave	0.50 0.10	Not limited	

## Construction Materials

The tables "Construction Materials, Part I" and "Construction Materials, Part II" give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table "Construction Materials, Part I," only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good*, *fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the table "Construction Materials, Part II." The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

*Reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments. The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread. The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the

soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material. The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Construction Materials, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
AspA:					
Ashport-----	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AstA:					
Ashport-----	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BetA, BetB:					
Bethany-----	93	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BocA:					
Bocox-----	94	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Bt1A:					
Bathel-----	94	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CaaA:					
Canadian-----	94	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CAID:					
Coyle-----	31	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ashport-----	28	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ironmound-----	22	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CoIC2:					
Coyle-----	61	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ironmound-----	33	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

## Construction Materials, Part I--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
CoUB: Coyle-----	55	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	40	Not rated		Not rated	
CoUC: Coyle-----	42	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	38	Not rated		Not rated	
CoyB, CoyC2: Coyle-----	91	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
CoZC3: Coyle-----	70	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Zaneis-----	15	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
DAM: Dam-----	100	Not rated		Not rated	
DerB: Derby-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.02 0.02
DerD: Derby-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.08 0.14
DerE: Derby-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.02 0.14
DiRG: Darsil-----	67	Poor Bottom layer Thickest layer	0.00 0.00	Fair Thickest layer Bottom layer	0.01 0.02
Rock outcrop-----	20	Not rated		Not rated	
DouB: Dougherty-----	91	Poor Bottom layer Thickest layer	0.00 0.00	Fair Thickest layer Bottom layer	0.00 0.06
DouD: Dougherty-----	91	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.00 0.05

## Construction Materials, Part I--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
DUM: Dumps-----	100	Not rated		Not rated	
EasA: Easpur-----	93	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GadA: Gaddy-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GaGA: Gaddy-----	67	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Gracemore-----	23	Poor Bottom layer Thickest layer	0.00 0.00	Fair Thickest layer Bottom layer	0.00 0.13
GMGE4: Grainola-----	40	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Masham-----	30	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Gullied land-----	20	Not rated		Not rated	
GMLG: Grainola-----	37	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Masham-----	22	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Lucien-----	21	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GohC, GohE, GooE, GooG: Goodnight-----	92	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.12 0.12
GraC: Grainola-----	88	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GraD2: Grainola-----	89	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

## Construction Materials, Part I--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
GrHC: Grant-----	45	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Huska-----	35	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GrIE: Grainola-----	71	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ironmound-----	20	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
GrLE: Grainola-----	55	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Lucien-----	26	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
HaGD4: Harrah-----	70	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Gullied land-----	15	Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
HarG: Harrah-----	86	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
HawB: Hawley-----	94	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
ICGD3: Ironmound-----	40	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Coyle-----	30	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Grainola-----	15	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

## Construction Materials, Part I-Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
IrCE: Ironmound-----	53	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Coyle-----	22	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
IroC2: Ironmound-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
KgfB: Kingfisher-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
KinC2: Kingfisher-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
KonB: Konawa-----	96	Poor Bottom layer Thickest layer	0.00 0.00	Fair Thickest layer Bottom layer	0.01 0.06
KonD2: Konawa-----	96	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
KrdA, KrkB: Kirkland-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
LarA: Lawrie-----	94	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
LawA: Lawrie-----	86	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
LerA: Lebron-----	80	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
LitB, LitC2: Littleaxe-----	80	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
M-W: Miscellaneous water-	100	Not rated		Not rated	



## Construction Materials, Part I-Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
MaID: Masham-----	52	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ironmound-----	27	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
MaIG: Masham-----	73	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ironmound-----	17	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
MinB, MinC, MinD, MinF: Minco-----	91	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
M11A: Miller-----	95	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
MulC, MulC2: Mulhall-----	88	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
NavA, NavB: Navina-----	96	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
NeGD4: Newalla-----	75	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Gullied land-----	15	Not rated		Not rated	
NewB: Newalla-----	90	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
NorA: Norge-----	93	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
NorB: Norge-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

## Construction Materials, Part I-Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
NorC2: Norge-----	88	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
OWHD: Oil waste land-----	50	Not rated		Not rated	
Huska-----	30	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
PieB: Piedmont-----	92	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
PieC2: Piedmont-----	93	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
PIT: Pits-----	100	Not rated		Not rated	
PukA, Pula: Pulaski-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
RenB, RenC: Renfrow-----	89	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
RewC2: Renfrow-----	84	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
RinB: Renthin-----	81	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
RnnC2: Renthin-----	80	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
SDGD4: Stephenville-----	32	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Darsil-----	31	Poor Bottom layer Thickest layer	0.00 0.00	Fair Thickest layer Bottom layer	0.00 0.02
Gullied land-----	23	Not rated		Not rated	

## Construction Materials, Part I--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
SDND:					
Stephenville-----	44	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darsil-----	29	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.02
		Thickest layer	0.00	Thickest layer	0.02
Newalla-----	21	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SDND2:					
Stephenville-----	44	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darsil-----	33	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02
Newalla-----	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SlaB:					
Slaughterville-----	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SlaD, SlaF:					
Slaughterville-----	95	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
StDC:					
Stephenville-----	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darsil-----	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02
StDC2:					
Stephenville-----	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darsil-----	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02
StDE:					
Stephenville-----	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darsil-----	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02

## Construction Materials, Part I-Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
SteB: Stephenville-----	94	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
SteC2: Stephenville-----	92	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
SUND: Stephenville-----	35	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	30	Not rated		Not rated	
Newalla-----	15	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
TelB, TelC2: Teller-----	96	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
TriA: Tribbey-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.00 0.01
URB: Urban land-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.00 0.01
ZaHC: Zaneis-----	55	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Huska-----	25	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
ZanB, ZanC, ZanC2: Zaneis-----	87	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

## Construction Materials, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Fair Low content of organic matter Water erosion	0.88 0.99	Poor Low strength Shrink-swell	0.00 0.87	Good	
AstA: Ashport-----	90	Fair Low content of organic matter Water erosion	0.88 0.99	Poor Low strength Shrink-swell	0.00 0.89	Good	
BetA: Bethany-----	93	Poor Too clayey Water erosion	0.00 0.90	Poor Low strength Shrink-swell	0.00 0.38	Poor Too clayey	0.00
BetB: Bethany-----	93	Fair Water erosion Too clayey	0.90 0.98	Poor Low strength Shrink-swell	0.00 0.28	Fair Too clayey	0.93
BocA: Bocox-----	94	Poor Wind erosion Low content of organic matter Too sandy	0.00 0.12 0.53	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone Too sandy	0.00 0.53
Bt1A: Bathel-----	94	Poor Wind erosion Low content of organic matter Too clayey Too acid	0.00 0.12 0.95 0.97	Fair Depth to saturated zone	0.98	Fair Too clayey Depth to saturated zone	0.55 0.98
CaaA: Canadian-----	94	Fair Low content of organic matter	0.50	Good		Good	
CAID: Coyle-----	31	Fair Low content of organic matter Depth to bedrock Droughty Water erosion	0.12 0.93 0.98 0.99	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Rock fragments Depth to bedrock	0.00 0.99 0.93
Ashport-----	28	Fair Low content of organic matter Water erosion	0.88 0.99	Poor Low strength Shrink-swell	0.00 0.89	Good	

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CAID: Ironmound-----	22	Poor Depth to bedrock Droughty Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
CoIC2: Coyle-----	61	Fair Low content of organic matter Depth to bedrock Water erosion	0.88 0.97 0.99	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Depth to bedrock	0.20 0.97
Ironmound-----	33	Poor Depth to bedrock Droughty Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
CoUB: Coyle-----	55	Fair Depth to bedrock Droughty Water erosion	0.03 0.12 0.99	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.03
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Fair Depth to bedrock Droughty Water erosion Low content of organic matter	0.46 0.65 0.99 0.88	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.46
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Fair Depth to bedrock Droughty Low content of organic matter Water erosion	0.65 0.74 0.88 0.99	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.65
CoyC2: Coyle-----	91	Fair Low content of organic matter Depth to bedrock Droughty Water erosion	0.12 0.29 0.40 0.99	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Rock fragments	0.00 0.29 0.88
CoZC3: Coyle-----	70	Fair Low content of organic matter Depth to bedrock Droughty Water erosion	0.12 0.65 0.74 0.99	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Rock fragments	0.00 0.65 0.88

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoZC3: Zaneis-----	15	Fair Low content of organic matter Water erosion	0.88 0.99	Fair Depth to bedrock Shrink-swell	0.29 0.99	Poor Hard to reclaim (dense layer)	0.00
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Poor Wind erosion Low content of organic matter Too sandy	0.00 0.12 0.36	Good		Fair Too sandy	0.36
DerD: Derby-----	90	Poor Too sandy Wind erosion Low content of organic matter	0.00 0.00 0.12	Good		Poor Too sandy	0.00
DerE: Derby-----	90	Poor Too sandy Wind erosion Low content of organic matter	0.00 0.00 0.12	Good		Poor Too sandy Slope	0.00 0.37
DiRG: Darsil-----	67	Poor Wind erosion Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.00 0.12 0.41	Poor Depth to bedrock Slope	0.00 0.00	Poor Slope Hard to reclaim Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.00 0.41 0.88
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Poor Wind erosion Low content of organic matter Too acid	0.00 0.12 0.84	Good		Good	
DouD: Dougherty-----	91	Poor Too sandy Wind erosion Low content of organic matter Too acid	0.00 0.00 0.12 0.84	Good		Poor Too sandy	0.00
DUM: Dumps-----	100	Not rated		Not rated		Not rated	

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
EasA: Easpur-----	93	Fair Low content of organic matter Water erosion	0.88 0.99	Good		Good	
GadA: Gaddy-----	85	Poor Wind erosion Low content of organic matter	0.00 0.88	Good		Good	
GaGA: Gaddy-----	67	Fair Low content of organic matter	0.88	Good		Good	
Gracemore-----	23	Poor Too sandy Low content of organic matter	0.00 0.12	Poor Depth to saturated zone	0.00	Poor Too sandy Depth to saturated zone	0.00 0.00
GMGE4: Grainola-----	40	Poor Too clayey Low content of organic matter Depth to bedrock Water erosion Droughty	0.00 0.12 0.99 0.99 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Hard to reclaim Too clayey Slope Depth to bedrock	0.00 0.00 0.84 0.99
Masham-----	30	Poor Low content of organic matter Depth to bedrock Droughty Low content of organic matter Water erosion	0.00 0.00 0.00 0.12 0.90	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Hard to reclaim (dense layer) Depth to bedrock Slope	0.00 0.00 0.84
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Poor Too clayey Low content of organic matter Droughty Depth to bedrock Water erosion	0.00 0.12 0.36 0.54 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Rock fragments Too clayey Slope Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00 0.00 0.10 0.54
Masham-----	22	Poor Droughty Too clayey Depth to bedrock Low content of organic matter Water erosion	0.00 0.00 0.00 0.12 0.90	Poor Depth to bedrock Slope Low strength Shrink-swell	0.00 0.00 0.00 0.00	Poor Slope Hard to reclaim (dense layer) Depth to bedrock Too clayey	0.00 0.00 0.00 0.00 0.00



## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GMLG: Lucien-----	21	Poor Depth to bedrock Droughty	0.00 0.00	Poor Depth to bedrock Slope	0.00 0.82	Poor Slope Hard to reclaim (dense layer) Depth to bedrock Rock fragments	0.00 0.00 0.00 0.88
GohC: Goodnight-----	92	Poor Wind erosion Too sandy Low content of organic matter Droughty	0.00 0.00 0.88 0.99	Good		Poor Too sandy	0.00
GohE: Goodnight-----	92	Poor Wind erosion Too sandy Low content of organic matter Droughty	0.00 0.00 0.88 0.99	Good		Poor Too sandy Slope	0.00 0.84
GooE: Goodnight-----	92	Poor Wind erosion Too sandy Low content of organic matter Droughty	0.00 0.00 0.88 0.95	Good		Poor Too sandy	0.00
GooG: Goodnight-----	92	Poor Wind erosion Too sandy Low content of organic matter Droughty	0.00 0.00 0.88 0.93	Fair Slope	0.08	Poor Slope Too sandy	0.00 0.00
GraC: Grainola-----	88	Poor Too clayey Low content of organic matter Depth to bedrock Droughty Water erosion	0.00 0.12 0.71 0.86 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Hard to reclaim (dense layer) Too clayey Depth to bedrock Rock fragments	0.00 0.00 0.00 0.71 0.97
GraD2: Grainola-----	89	Poor Too clayey Low content of organic matter Depth to bedrock Water erosion	0.00 0.12 0.99 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Too clayey Hard to reclaim (dense layer) Rock fragments Depth to bedrock	0.00 0.20 0.97 0.99

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrHC: Grant-----	45	Fair Low content of organic matter Water erosion	0.88 0.99	Poor Low strength Depth to bedrock	0.00 0.87	Poor Hard to reclaim (dense layer)	0.00
Huska-----	35	Poor Sodium content Too clayey Droughty Low content of organic matter Water erosion Salinity	0.00 0.00 0.49 0.50 0.68 0.97	Poor Low strength Shrink-swell Depth to bedrock	0.00 0.12 0.58	Poor Hard to reclaim (dense layer) Sodium content Too clayey Salinity	0.00 0.00 0.00 0.00 0.00
GrIE: Grainola-----	71	Poor Too clayey Low content of organic matter Depth to bedrock Water erosion	0.00 0.12 0.99 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Hard to reclaim (dense layer) Too clayey Depth to bedrock	0.00 0.00 0.00 0.99
Ironmound-----	20	Poor Depth to bedrock Droughty Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
GrLE: Grainola-----	55	Poor Too clayey Low content of organic matter Depth to bedrock Droughty Water erosion	0.00 0.12 0.26 0.48 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Too clayey Hard to reclaim (dense layer) Depth to bedrock Slope Rock fragments	0.00 0.00 0.00 0.26 0.96 0.97
Lucien-----	26	Poor Droughty Depth to bedrock	0.00 0.00	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Rock fragments Slope	0.00 0.00 0.95 0.96
HaGD4: Harrah-----	70	Fair Low content of organic matter Too acid	0.50 0.88	Good		Good	
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Fair Low content of organic matter Too acid	0.50 0.88	Good		Good	

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HarG: Harrah-----	86	Fair Low content of organic matter Too acid	0.50 0.88	Fair Slope	0.02	Poor Slope	0.00
HawB: Hawley-----	94	Poor Wind erosion Low content of organic matter	0.00 0.12	Good		Good	
ICGD3: Ironmound-----	40	Poor Droughty Depth to bedrock Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
Coyle-----	30	Fair Low content of organic matter Depth to bedrock Droughty Water erosion	0.12 0.90 0.96 0.99	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Rock fragments Depth to bedrock	0.01 0.88 0.90
Grainola-----	15	Poor Too clayey Low content of organic matter Droughty Depth to bedrock Water erosion	0.00 0.12 0.70 0.84 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Too clayey Hard to reclaim (dense layer) Depth to bedrock Rock fragments	0.00 0.03 0.84 0.97
IrCE: Ironmound-----	53	Poor Droughty Depth to bedrock Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Slope	0.00 0.00 0.84
Coyle-----	22	Fair Depth to bedrock Droughty Low content of organic matter	0.21 0.43 0.88	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Slope	0.00 0.21 0.84
IroC2: Ironmound-----	90	Poor Depth to bedrock Droughty Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
KgfB: Kingfisher-----	90	Fair Low content of organic matter Too clayey Depth to bedrock Water erosion	0.12 0.98 0.99 0.99	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.87	Fair Hard to reclaim (dense layer) Too clayey Depth to bedrock	0.03 0.57 0.99

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KinC2: Kingfisher-----	90	Fair Depth to bedrock Droughty Water erosion	 0.29 0.82 0.99	Poor Depth to bedrock Low strength Shrink-swell	 0.00 0.00 0.87	Poor Hard to reclaim (dense layer) Depth to bedrock	 0.00  0.29
KonB, KonD2: Konawa-----	96	Poor Wind erosion Low content of organic matter Too acid	 0.00 0.32 0.84	Good		Good	
KrdA: Kirkland-----	90	Poor Too clayey Water erosion Sodium content	 0.00 0.68 0.78	Poor Low strength Shrink-swell	 0.00 0.12	Poor Too clayey Sodium content	 0.00 0.78
KrkB: Kirkland-----	90	Poor Too clayey Sodium content Water erosion	 0.00 0.78 0.90	Poor Low strength Shrink-swell	 0.00 0.07	Poor Too clayey Sodium content Hard to reclaim (dense layer)	 0.00 0.78 0.84
LarA: Lawrie-----	94	Fair Low content of organic matter Water erosion	 0.50 0.99	Poor Low strength Shrink-swell	 0.00 0.96	Good	
LawA: Lawrie-----	86	Fair Water erosion	 0.99	Poor Low strength Shrink-swell	 0.00 0.87	Good	
LerA: Lebron-----	80	Fair Too clayey Low content of organic matter Water erosion	 0.08 0.12 0.90	Poor Depth to saturated zone	 0.00	Poor Depth to saturated zone Too clayey	 0.00  0.05
LitB: Littleaxe-----	80	Fair Low content of organic matter Too acid	 0.50 0.68	Fair Depth to bedrock	 0.99	Poor Hard to reclaim (dense layer)	 0.00
LitC2: Littleaxe-----	80	Fair Low content of organic matter Too acid	 0.50 0.68	Fair Depth to bedrock	 0.74	Poor Hard to reclaim (dense layer)	 0.00
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaID: Masham-----	52	Poor Depth to bedrock Droughty Too clayey Low content of organic matter Water erosion	0.00 0.00 0.00 0.12 0.90	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too clayey Slope	0.00 0.00 0.00 0.63
Ironmound-----	27	Poor Droughty Depth to bedrock	0.00 0.00	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Slope	0.00 0.00 0.84
MaIG: Masham-----	73	Poor Droughty Depth to bedrock Too clayey Low content of organic matter Water erosion	0.00 0.00 0.00 0.12 0.90	Poor Depth to bedrock Slope	0.00 0.00	Poor Slope Hard to reclaim (dense layer) Depth to bedrock Too clayey	0.00 0.00 0.00 0.00
Ironmound-----	17	Poor Depth to bedrock Droughty Low content of organic matter	0.00 0.00 0.12	Poor Depth to bedrock Slope	0.00 0.08	Poor Slope Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00 0.00
MinB, MinC, MinD: Minco-----	91	Fair Water erosion	0.99	Good		Good	
MinF: Minco-----	91	Fair Water erosion	0.99	Fair Slope	0.68	Poor Slope	0.00
M11A: Miller-----	95	Poor Too clayey Low content of organic matter Water erosion	0.00 0.88 0.99	Poor Low strength Shrink-swell	0.00 0.12	Poor Too clayey	0.00
MulC: Mulhall-----	88	Fair Low content of organic matter Water erosion	0.12 0.99	Good		Poor Hard to reclaim (dense layer) Rock fragments	0.00 0.88
MulC2: Mulhall-----	88	Fair Low content of organic matter Water erosion	0.12 0.99	Good		Fair Hard to reclaim (dense layer) Rock fragments	0.03 0.88
NavA, NavB: Navina-----	96	Fair Low content of organic matter Water erosion	0.88 0.99	Good		Good	

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NeGD4: Newalla-----	75	Poor Too clayey Low content of organic matter Too acid Water erosion	 0.00 0.12  0.88 0.90	Poor Low strength Shrink-swell Depth to bedrock	 0.00 0.16 0.23	Poor Too clayey Hard to reclaim (dense layer)	 0.00 0.35
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Poor Too clayey Low content of organic matter Too acid Water erosion	 0.00 0.12  0.88 0.90	Poor Low strength Depth to bedrock Shrink-swell	 0.00 0.23 0.50	Poor Too clayey Hard to reclaim (dense layer)	 0.00 0.00
NorA: Norge-----	93	Fair Low content of organic matter Too clayey Water erosion	 0.88  0.98 0.99	Poor Low strength Shrink-swell	 0.00 0.93	Fair Too clayey	 0.70
NorB: Norge-----	90	Fair Low content of organic matter Too clayey Water erosion	 0.88  0.98 0.99	Poor Low strength Shrink-swell	 0.00 0.89	Fair Too clayey	 0.70
NorC2: Norge-----	88	Fair Low content of organic matter Too clayey Water erosion	 0.88  0.98 0.99	Poor Low strength Shrink-swell	 0.00 0.87	Fair Too clayey	 0.70
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Poor Sodium content Too clayey Low content of organic matter Water erosion Droughty Salinity	 0.00 0.00 0.50  0.68 0.91 0.97	Poor Low strength Shrink-swell	 0.00 0.12	Poor Hard to reclaim (dense layer) Sodium content Too clayey Salinity	 0.00  0.00 0.00 0.00
PieB: Piedmont-----	92	Poor Too clayey Depth to bedrock Low content of organic matter Water erosion Droughty	 0.00 0.71 0.88  0.90 0.93	Poor Depth to bedrock Low strength Shrink-swell	 0.00 0.00 0.12	Poor Hard to reclaim (dense layer) Too clayey Depth to bedrock	 0.00  0.00 0.71

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PieC2: Piedmont-----	93	Poor Too clayey Depth to bedrock Droughty Low content of organic matter Water erosion	0.00 0.29 0.31 0.88 0.90	Poor Depth to bedrock Low strength Shrink-swell	0.00 0.00 0.12	Poor Hard to reclaim (dense layer) Too clayey Rock fragments Depth to bedrock	0.00 0.00 0.00 0.28 0.29
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA, Pula: Pulaski-----	85	Fair Low content of organic matter	0.50	Good		Good	
RenB: Renfrow-----	89	Poor Too clayey Water erosion Low content of organic matter	0.00 0.68 0.88	Poor Low strength Shrink-swell	0.00 0.25	Poor Hard to reclaim (dense layer) Too clayey	0.00 0.00
RenC: Renfrow-----	89	Fair Too clayey Water erosion Low content of organic matter	0.08 0.68 0.88	Poor Low strength Shrink-swell	0.00 0.20	Poor Hard to reclaim (dense layer) Too clayey	0.00 0.06
RewC2: Renfrow-----	84	Poor Too clayey Low content of organic matter Water erosion	0.00 0.88 0.90	Poor Low strength Shrink-swell	0.00 0.12	Poor Too clayey Hard to reclaim (dense layer)	0.00 0.10
RinB: Renthin-----	81	Poor Too clayey Water erosion Low content of organic matter	0.00 0.68 0.88	Poor Low strength Shrink-swell Depth to bedrock	0.00 0.15 0.87	Poor Hard to reclaim (dense layer) Too clayey Rock fragments	0.00 0.00 0.28
RnnC2: Renthin-----	80	Poor Too clayey Water erosion Low content of organic matter	0.00 0.68 0.88	Poor Low strength Shrink-swell Depth to bedrock	0.00 0.12 0.58	Poor Too clayey Hard to reclaim (dense layer)	0.00 0.00
SDGD4: Stephenville-----	32	Fair Depth to bedrock Droughty Too acid Low content of organic matter	0.03 0.08 0.54 0.88	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too acid	0.00 0.03 0.98

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDGD4: Darsil-----	31	Poor Wind erosion Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.00 0.12 0.41	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.41 0.88
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Fair Depth to bedrock Droughty Too acid Low content of organic matter	0.35 0.41 0.54 0.88	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Depth to bedrock Too acid	0.35 0.35 0.98
Darsil-----	29	Poor Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.12 0.41	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.41 0.88
Newalla-----	21	Poor Too clayey Low content of organic matter Too acid Water erosion	0.00 0.00 0.88 0.90	Poor Low strength Shrink-swell Depth to bedrock	0.00 0.22 0.39	Poor Too clayey Hard to reclaim (dense layer)	0.00 0.00
SDND2: Stephenville-----	44	Fair Depth to bedrock Too acid Droughty Low content of organic matter	0.54 0.54 0.71 0.88	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too acid	0.00 0.54 0.98
Darsil-----	33	Poor Droughty Depth to bedrock	0.00 0.00	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock	0.00 0.00
Newalla-----	20	Poor Too clayey Low content of organic matter Too acid Water erosion	0.00 0.12 0.88 0.90	Poor Low strength Depth to bedrock Shrink-swell	0.00 0.00 0.20	Poor Too clayey Hard to reclaim (dense layer)	0.00 0.20
SlaB: Slaughterville-----	95	Fair Low content of organic matter Too acid	0.50 0.92	Good		Good	



## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SlaD: Slaughterville-----	95	Fair Low content of organic matter	0.50	Good		Good	
SlaF: Slaughterville-----	95	Fair Low content of organic matter	0.50	Good		Fair Slope	0.04
StDC: Stephenville-----	55	Fair Depth to bedrock Too acid Droughty Low content of organic matter	0.54 0.54 0.57 0.88	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Depth to bedrock Too acid	0.05 0.54 0.98
Darsil-----	30	Poor Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.12 0.41	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.41 0.88
StDC2: Stephenville-----	55	Fair Too acid Low content of organic matter Depth to bedrock	0.54 0.88 0.99	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Too acid Depth to bedrock	0.01 0.98 0.99
Darsil-----	30	Poor Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.12 0.41	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.41 0.88
StDE: Stephenville-----	50	Fair Depth to bedrock Droughty Too acid Low content of organic matter	0.29 0.32 0.54 0.88	Poor Depth to bedrock	0.00	Fair Slope Hard to reclaim (dense layer) Depth to bedrock Too acid	0.04 0.29 0.29 0.98
Darsil-----	40	Poor Wind erosion Droughty Depth to bedrock Low content of organic matter Too sandy	0.00 0.00 0.00 0.12 0.41	Poor Depth to bedrock	0.00	Poor Hard to reclaim (dense layer) Depth to bedrock Too sandy Rock fragments	0.00 0.00 0.41 0.88
SteB: Stephenville-----	94	Fair Too acid Low content of organic matter Depth to bedrock Droughty	0.54 0.88 0.90 0.95	Poor Depth to bedrock	0.00	Fair Hard to reclaim Depth to bedrock Too acid	0.03 0.90 0.98

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SteC2: Stephenville-----	92	Fair Depth to bedrock Too acid Droughty Low content of organic matter	0.46 0.54 0.65 0.88	Poor Depth to bedrock	0.00	Fair Hard to reclaim Depth to bedrock Too acid	0.46 0.46 0.98
SUND: Stephenville-----	35	Fair Depth to bedrock Droughty Too acid Low content of organic matter	0.35 0.53 0.54 0.88	Poor Depth to bedrock	0.00	Fair Hard to reclaim (dense layer) Depth to bedrock Too acid	0.35 0.35 0.98
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Poor Too clayey Low content of organic matter Water erosion Too acid	0.00 0.12 0.68 0.88	Poor Low strength Shrink-swell Depth to bedrock	0.00 0.15 0.99	Poor Too clayey Hard to reclaim (dense layer)	0.00 0.84
TelB, TelC2: Teller-----	96	Fair Low content of organic matter Water erosion	0.88 0.99	Good		Good	
TriA: Tribbey-----	90	Fair Low content of organic matter	0.12	Fair Depth to saturated zone	0.53	Fair Depth to saturated zone	0.53
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Fair Low content of organic matter	0.12	Good		Good	
ZaHC: Zaneis-----	55	Fair Low content of organic matter Water erosion	0.88 0.99	Fair Depth to bedrock	0.74	Fair Hard to reclaim (dense layer)	0.16
Huska-----	25	Poor Sodium content Too clayey Low content of organic matter Water erosion Droughty Salinity	0.00 0.05 0.50 0.68 0.85 0.97	Poor Low strength Shrink-swell	0.00 0.12	Poor Hard to reclaim (dense layer) Sodium content Salinity Too clayey	0.00 0.00 0.00 0.03

## Construction Materials, Part II--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZanB: Zaneis-----	87	Fair Low content of organic matter Water erosion	0.88 0.99	Fair Depth to bedrock Shrink-swell	0.12 0.99	Poor Hard to reclaim (dense layer)	0.00
ZanC: Zaneis-----	87	Fair Low content of organic matter Water erosion	0.88 0.99	Fair Depth to bedrock Shrink-swell	0.29 0.99	Poor Hard to reclaim (dense layer)	0.00
ZanC2: Zaneis-----	87	Fair Low content of organic matter Water erosion	0.88 0.99	Fair Depth to bedrock Shrink-swell	0.95 0.99	Poor Hard to reclaim (dense layer)	0.00

## Water Management

The table "Water Management" gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses.

*Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

*Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

*Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 6 feet. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction. The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties. Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

## Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.80	Very limited Depth to water	1.00
AstA: Ashport-----	90	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.13	Very limited Depth to water	1.00
BetA, BetB: Bethany-----	93	Somewhat limited Seepage	0.04	Not limited		Very limited Depth to water	1.00
BocA: Bocox-----	94	Very limited Seepage	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Cutbanks cave	1.00
Bt1A: Bathel-----	94	Very limited Seepage	1.00	Very limited Ponding Depth to saturated zone	1.00 0.68	Somewhat limited Depth to water Cutbanks cave	0.14 0.10
CaaA: Canadian-----	94	Very limited Seepage	1.00	Not limited		Very limited Depth to water	1.00
CAID: Coyle-----	31	Somewhat limited Seepage Depth to bedrock	0.72 0.03	Very limited Piping	1.00	Very limited Depth to water	1.00
Ashport-----	28	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.81	Very limited Depth to water	1.00
Ironmound-----	22	Somewhat limited Depth to bedrock	0.53	Very limited Piping	1.00	Very limited Depth to water	1.00
CoIC2: Coyle-----	61	Somewhat limited Seepage Depth to bedrock	0.72 0.02	Very limited Piping	1.00	Very limited Depth to water	1.00
Ironmound-----	33	Somewhat limited Depth to bedrock	0.58	Not limited		Very limited Depth to water	1.00
CoUB: Coyle-----	55	Somewhat limited Seepage Depth to bedrock	0.72 0.37	Very limited Piping Thin layer	1.00 0.99	Very limited No ground water	1.00
Urban land-----	40	Not rated		Not rated		Not rated	

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoUC: Coyle-----	42	Somewhat limited Seepage Depth to bedrock	0.72 0.13	Not limited		Very limited Depth to water	1.00
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Somewhat limited Seepage Depth to bedrock	0.72 0.09	Not limited		Very limited Depth to water	1.00
CoyC2: Coyle-----	91	Somewhat limited Seepage Depth to bedrock	0.72 0.19	Not limited		Very limited Depth to water	1.00
CoZC3: Coyle-----	70	Somewhat limited Seepage Depth to bedrock	0.72 0.09	Not limited		Very limited Depth to water	1.00
Zaneis-----	15	Somewhat limited Seepage Depth to bedrock	0.72 0.01	Not limited		Very limited Depth to water	1.00
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Very limited Seepage	1.00	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
DerD: Derby-----	90	Very limited Seepage	1.00	Somewhat limited Seepage	0.14	Very limited Depth to water	1.00
DerE: Derby-----	90	Very limited Seepage Slope	1.00 0.01	Somewhat limited Seepage	0.14	Very limited Depth to water	1.00
DiRG: Darsil-----	67	Somewhat limited Depth to bedrock Seepage Slope	0.61 0.54 0.50	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
DouD: Dougherty-----	91	Very limited Seepage	1.00	Somewhat limited Seepage	0.05	Very limited Depth to water	1.00
DUM: Dumps-----	100	Not rated		Not rated		Not rated	

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
EasA: Easpur-----	93	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.99	Very limited Depth to water	1.00
GadA: Gaddy-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
GaGA: Gaddy-----	67	Very limited Seepage	1.00	Not limited		Very limited Depth to water	1.00
Gracemore-----	23	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.13	Very limited Cutbanks cave	1.00
GMGE4: Grainola-----	40	Somewhat limited Depth to bedrock	0.02	Not limited		Very limited Depth to water	1.00
Masham-----	30	Somewhat limited Depth to bedrock	0.61	Not limited		Very limited Depth to water	1.00
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Somewhat limited Depth to bedrock Slope	0.11 0.03	Not limited		Very limited Depth to water	1.00
Masham-----	22	Somewhat limited Depth to bedrock Slope	0.74 0.50	Not limited		Very limited Depth to water	1.00
Lucien-----	21	Somewhat limited Depth to bedrock Slope	0.58 0.08	Not limited		Very limited Depth to water	1.00
GohC, GohE, GooE: Goodnight-----	92	Very limited Seepage	1.00	Somewhat limited Seepage	0.12	Very limited Depth to water	1.00
GooG: Goodnight-----	92	Very limited Seepage Slope	1.00 0.21	Somewhat limited Seepage	0.12	Very limited Depth to water	1.00
GraC: Grainola-----	88	Somewhat limited Depth to bedrock	0.08	Somewhat limited Piping	0.12	Very limited Depth to water	1.00
GraD2: Grainola-----	89	Somewhat limited Depth to bedrock	0.02	Somewhat limited Piping	0.04	Very limited Depth to water	1.00

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrHC: Grant-----	45	Somewhat limited Seepage Depth to bedrock	0.72 0.01	Somewhat limited Piping	0.94	Very limited Depth to water	1.00
Huska-----	35	Somewhat limited Depth to bedrock	0.01	Very limited Piping Salinity	1.00 0.03	Very limited Depth to water	1.00
GrIE: Grainola-----	71	Somewhat limited Depth to bedrock	0.02	Somewhat limited Thin layer	0.56	Very limited No ground water	1.00
Ironmound-----	20	Somewhat limited Depth to bedrock	0.53	Very limited Thin layer Piping	1.00 1.00	Very limited No ground water	1.00
GrLE: Grainola-----	55	Somewhat limited Depth to bedrock	0.20	Somewhat limited Piping	0.01	Very limited Depth to water	1.00
Lucien-----	26	Somewhat limited Depth to bedrock	0.78	Very limited Piping	1.00	Very limited Depth to water	1.00
HaGD4: Harrah-----	70	Somewhat limited Seepage	0.72	Not limited		Very limited Depth to water	1.00
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Somewhat limited Seepage	0.72	Not limited		Very limited Depth to water	1.00
HarG: Harrah-----	86	Somewhat limited Seepage Slope	0.72 0.24	Not limited		Very limited Depth to water	1.00
HawB: Hawley-----	94	Very limited Seepage	1.00	Very limited Piping Seepage	1.00 0.01	Very limited Depth to water	1.00
ICGD3: Ironmound-----	40	Somewhat limited Depth to bedrock	0.78	Not limited		Very limited Depth to water	1.00
Coyle-----	30	Somewhat limited Seepage Depth to bedrock	0.72 0.04	Very limited Piping	1.00	Very limited Depth to water	1.00
Grainola-----	15	Somewhat limited Depth to bedrock	0.05	Not limited		Very limited Depth to water	1.00



## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
IrCE: Ironmound-----	53	Somewhat limited Depth to bedrock	0.66	Not limited		Very limited Depth to water	1.00
Coyle-----	22	Somewhat limited Seepage Depth to bedrock	0.72 0.23	Not limited		Very limited Depth to water	1.00
IroC2: Ironmound-----	90	Somewhat limited Depth to bedrock	0.61	Not limited		Very limited Depth to water	1.00
Kgfb: Kingfisher-----	90	Somewhat limited Seepage Depth to bedrock	0.04 0.02	Somewhat limited Piping	0.33	Very limited Depth to water	1.00
KinC2: Kingfisher-----	90	Somewhat limited Depth to bedrock Seepage	0.19 0.04	Somewhat limited Piping	0.99	Very limited Depth to water	1.00
KonB: Konawa-----	96	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
KonD2: Konawa-----	96	Very limited Seepage	1.00	Not limited		Very limited Depth to water	1.00
KrdA, KrkB: Kirkland-----	90	Not limited		Very limited Hard to pack	1.00	Very limited Depth to water	1.00
LarA: Lawrie-----	94	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.70	Very limited Depth to water	1.00
LawA: Lawrie-----	86	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.65	Very limited Depth to water	1.00
LerA: Lebron-----	80	Very limited Seepage	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Cutbanks cave	1.00
LitB, LitC2: Littleaxe-----	80	Very limited Seepage Depth to bedrock	1.00 0.01	Not limited		Very limited Depth to water	1.00
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaID: Masham-----	52	Somewhat limited Depth to bedrock Slope	0.61 0.01	Not limited		Very limited Depth to water	1.00
Ironmound-----	27	Somewhat limited Depth to bedrock	0.80	Not limited		Very limited Depth to water	1.00
MaIG: Masham-----	73	Somewhat limited Depth to bedrock Slope	0.78 0.64	Somewhat limited Piping	0.74	Very limited Depth to water	1.00
Ironmound-----	17	Somewhat limited Depth to bedrock Slope	0.66 0.21	Very limited Piping	1.00	Very limited Depth to water	1.00
MinB, MinC, MinD: Minco-----	91	Somewhat limited Seepage	0.72	Very limited Piping	1.00	Very limited Depth to water	1.00
MinF: Minco-----	91	Somewhat limited Seepage Slope	0.72 0.10	Very limited Piping	1.00	Very limited Depth to water	1.00
M11A: Miller-----	95	Not limited		Not limited		Very limited Depth to water	1.00
MulC: Mulhall-----	88	Somewhat limited Seepage	0.72	Very limited Piping	1.00	Very limited Depth to water	1.00
MulC2: Mulhall-----	88	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.94	Very limited Depth to water	1.00
NavA, NavB: Navina-----	96	Somewhat limited Seepage	0.72	Very limited Piping	1.00	Very limited Depth to water	1.00
NeGD4: Newalla-----	75	Somewhat limited Depth to bedrock	0.01	Somewhat limited Piping	0.31	Very limited Depth to water	1.00
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Somewhat limited Depth to bedrock	0.01	Somewhat limited Piping	0.34	Very limited Depth to water	1.00
NorA: Norge-----	93	Somewhat limited Seepage	0.54	Somewhat limited Piping	0.65	Very limited Depth to water	1.00
NorB: Norge-----	90	Somewhat limited Seepage	0.04	Somewhat limited Piping	0.53	Very limited Depth to water	1.00

## Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NorC2: Norge-----	88	Somewhat limited Seepage	0.04	Somewhat limited Piping	0.37	Very limited Depth to water	1.00
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Not limited		Very limited Piping Salinity	1.00 0.03	Very limited Depth to water	1.00
PieB: Piedmont-----	92	Somewhat limited Depth to bedrock	0.08	Somewhat limited Piping	0.12	Very limited Depth to water	1.00
PieC2: Piedmont-----	93	Somewhat limited Depth to bedrock	0.19	Somewhat limited Piping	0.52	Very limited Depth to water	1.00
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA, Pula: Pulaski-----	85	Very limited Seepage	1.00	Very limited Piping	1.00	Very limited Depth to water	1.00
RenB: Renfrow-----	89	Not limited		Somewhat limited Piping	0.01	Very limited Depth to water	1.00
RenC: Renfrow-----	89	Not limited		Somewhat limited Piping	0.04	Very limited Depth to water	1.00
RewC2: Renfrow-----	84	Not limited		Somewhat limited Piping	0.06	Very limited Depth to water	1.00
RinB: Renthin-----	81	Somewhat limited Depth to bedrock	0.01	Not limited		Very limited Depth to water	1.00
RnnC2: Renthin-----	80	Somewhat limited Depth to bedrock	0.01	Somewhat limited Piping	0.07	Very limited Depth to water	1.00
SDGD4: Stephenville-----	32	Somewhat limited Seepage Depth to bedrock	0.72 0.37	Not limited		Very limited Depth to water	1.00
Darsil-----	31	Somewhat limited Depth to bedrock Seepage	0.78 0.54	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
Gullied land-----	23	Not rated		Not rated		Not rated	

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND: Stephenville-----	44	Somewhat limited Seepage Depth to bedrock	0.72 0.17	Not limited		Very limited Depth to water	1.00
Darsil-----	29	Somewhat limited Seepage Depth to bedrock	0.54 0.53	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
Newalla-----	21	Somewhat limited Depth to bedrock	0.01	Not limited		Very limited Depth to water	1.00
SDND2: Stephenville-----	44	Somewhat limited Seepage Depth to bedrock	0.72 0.11	Not limited		Very limited Depth to water	1.00
Darsil-----	33	Somewhat limited Depth to bedrock Seepage	0.80 0.54	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
Newalla-----	20	Somewhat limited Depth to bedrock	0.01	Not limited		Very limited Depth to water	1.00
SlaB: Slaughterville-----	95	Very limited Seepage	1.00	Not limited		Very limited Depth to water	1.00
SlaD: Slaughterville-----	95	Very limited Seepage	1.00	Somewhat limited Seepage	0.07	Very limited Depth to water	1.00
SlaF: Slaughterville-----	95	Very limited Seepage Slope	1.00 0.02	Somewhat limited Seepage	0.07	Very limited Depth to water	1.00
StDC: Stephenville-----	55	Somewhat limited Seepage Depth to bedrock	0.72 0.11	Not limited		Very limited Depth to water	1.00
Darsil-----	30	Somewhat limited Depth to bedrock Seepage	0.66 0.54	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
StDC2: Stephenville-----	55	Somewhat limited Seepage Depth to bedrock	0.72 0.02	Not limited		Very limited Depth to water	1.00
Darsil-----	30	Somewhat limited Depth to bedrock Seepage	0.61 0.54	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
StDE: Stephenville-----	50	Somewhat limited Seepage Depth to bedrock Slope	0.72 0.19 0.02	Not limited		Very limited Depth to water	1.00
Darsil-----	40	Somewhat limited Depth to bedrock Seepage	0.61 0.54	Somewhat limited Seepage	0.02	Very limited Depth to water	1.00
SteB: Stephenville-----	94	Somewhat limited Seepage Depth to bedrock	0.72 0.04	Not limited		Very limited Depth to water	1.00
SteC2: Stephenville-----	92	Somewhat limited Seepage Depth to bedrock	0.72 0.13	Not limited		Very limited Depth to water	1.00
SUND: Stephenville-----	35	Somewhat limited Seepage Depth to bedrock	0.72 0.17	Not limited		Very limited Depth to water	1.00
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Somewhat limited Depth to bedrock	0.01	Somewhat limited Piping	0.03	Very limited Depth to water	1.00
TelB: Teller-----	96	Very limited Seepage	1.00	Very limited Piping	1.00	Very limited Depth to water	1.00
TelC2: Teller-----	96	Very limited Seepage	1.00	Somewhat limited Piping	0.99	Very limited Depth to water	1.00
TriA: Tribbey-----	90	Very limited Seepage	1.00	Very limited Depth to saturated zone	1.00	Very limited Cutbanks cave Depth to water	1.00 0.01
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Seepage	1.00	Very limited Piping	1.00	Very limited Depth to water	1.00
ZaHC: Zaneis-----	55	Somewhat limited Seepage Depth to bedrock	0.72 0.01	Very limited Piping	1.00	Very limited Depth to water	1.00
Huska-----	25	Not limited		Very limited Piping Salinity	1.00 0.03	Very limited Depth to water	1.00

## Water Management—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZanB, ZanC: Zaneis-----	87	Somewhat limited Seepage Depth to bedrock	0.72 0.01	Very limited Piping	1.00	Very limited Depth to water	1.00
ZanC2: Zaneis-----	87	Somewhat limited Seepage Depth to bedrock	0.72 0.01	Somewhat limited Piping	0.97	Very limited Depth to water	1.00

## Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

The tables "Agricultural Waste Management, Part I" and "Agricultural Waste Management, Part II" show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

*Disposal of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

*Overland flow of wastewater* is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film.



Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

*Rapid infiltration of wastewater* is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

*Slow rate treatment of wastewater* is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

## Agricultural Waste Management, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Somewhat limited Flooding	0.60	Very limited Flooding	1.00	Somewhat limited Flooding	0.60
AstA: Ashport-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
BetA, BetB: Bethany-----	93	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00
BocA: Bocox-----	94	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Runoff limitation	0.40				
Bt1A: Bathel-----	94	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	0.68	Depth to saturated zone	0.68	Depth to saturated zone	0.68
CaaA: Canadian-----	94	Somewhat limited Filtering capacity	0.01	Somewhat limited Flooding Filtering capacity	0.40 0.01	Somewhat limited Filtering capacity	0.01
CAID: Coyle-----	31	Very limited Restricted permeability	1.00	Very limited Low adsorption Restricted permeability	1.00 1.00	Very limited Restricted permeability	1.00
		Depth to bedrock	0.06	Depth to bedrock	0.06	Too steep for surface application	0.08
		Droughty	0.02	Droughty	0.02	Depth to bedrock Droughty	0.06 0.02
Ashport-----	28	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CAID: Ironmound-----	22	Very limited Depth to bedrock Depth to dense layer Restricted permeability Droughty	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Low adsorption Restricted permeability Droughty	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Droughty Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92 0.02
CoIC2: Coyle-----	61	Very limited Restricted permeability Depth to bedrock	1.00 0.03	Very limited Low adsorption Restricted permeability Depth to bedrock	1.00 1.00 0.03	Very limited Restricted permeability Too steep for surface application Depth to bedrock	1.00 0.08 0.03
Ironmound-----	33	Very limited Depth to bedrock Depth to dense layer Restricted permeability Droughty	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Low adsorption Restricted permeability Droughty	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Droughty Too steep for surface application	1.00 1.00 1.00 0.08
CoUB: Coyle-----	55	Very limited Dense layer Depth to bedrock Droughty	1.00 0.97 0.88	Very limited Low adsorption Depth to bedrock Droughty	1.00 0.97 0.88	Somewhat limited Depth to bedrock Droughty	0.97 0.88
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.54 0.35	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.54 0.35	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.54 0.35
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.35 0.26	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.35 0.26	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.35 0.26

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	unit	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoyC2: Coyle-----	91	Very limited Restricted permeability Depth to bedrock Droughty	1.00  0.71 0.60	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.71 0.60	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application	1.00  0.71 0.60 0.08
CoZC3: Coyle-----	70	Very limited Restricted permeability Depth to bedrock Droughty	1.00  0.35 0.26	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.35 0.26	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application	1.00  0.35 0.26 0.08
Zaneis-----	15	Very limited Restricted permeability	1.00	Very limited Low adsorption Restricted permeability	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00  0.08
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Very limited Filtering capacity Leaching limitation	1.00  0.45	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
DerD: Derby-----	90	Very limited Filtering capacity Leaching limitation	1.00  0.45	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application	1.00  0.68
DerE: Derby-----	90	Very limited Filtering capacity Slope Leaching limitation	1.00  0.63 0.45	Very limited Filtering capacity Slope	1.00  0.63	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application	1.00  1.00  0.78

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DiRG: Darsil-----	67	Very limited Slope Filtering capacity Depth to bedrock Droughty	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption Slope	1.00 1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Somewhat limited Leaching limitation Too acid Filtering capacity	0.45 0.11 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01
DouD: Dougherty-----	91	Somewhat limited Leaching limitation Too acid Filtering capacity	0.45 0.11 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01	Somewhat limited Too steep for surface application Too acid Filtering capacity	0.68 0.42 0.01
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Somewhat limited Flooding	0.60	Very limited Flooding	1.00	Somewhat limited Flooding	0.60
GadA: Gaddy-----	85	Very limited Filtering capacity Flooding Leaching limitation	1.00 0.60 0.45	Very limited Filtering capacity Flooding	1.00 1.00	Very limited Filtering capacity Flooding	1.00 0.60
GaGA: Gaddy-----	67	Very limited Filtering capacity Flooding Leaching limitation	1.00 1.00 0.45	Very limited Filtering capacity Flooding	1.00 1.00	Very limited Filtering capacity Flooding	1.00 1.00
Gracemore-----	23	Very limited Depth to saturated zone Flooding Filtering capacity	1.00 1.00 0.01	Very limited Depth to saturated zone Flooding Filtering capacity	1.00 1.00 0.01	Very limited Depth to saturated zone Flooding Filtering capacity	1.00 1.00 0.01

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	unit	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GMGE4: Grainola-----	40	Very limited Restricted permeability Runoff limitation Slope Depth to bedrock Droughty	1.00 0.40 0.16 0.01 0.01	Very limited Restricted permeability Low adsorption Slope Depth to bedrock Droughty	1.00 1.00 0.16 0.01 0.01	Very limited Restricted permeability Too steep for surface application Too steep for sprinkler application Depth to bedrock Droughty	1.00 1.00 0.40 0.01 0.01
Masham-----	30	Very limited Restricted permeability Depth to bedrock Depth to dense layer Droughty Runoff limitation	1.00 1.00 1.00 1.00 0.40	Very limited Restricted permeability Depth to bedrock Low adsorption Droughty Slope	1.00 1.00 1.00 1.00 0.16	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 0.40
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Restricted permeability Slope Droughty Depth to bedrock Runoff limitation	1.00 1.00 0.64 0.46 0.40	Very limited Restricted permeability Low adsorption Slope Droughty Depth to bedrock	1.00 1.00 1.00 0.64 0.46	Very limited Restricted permeability Too steep for surface application Too steep for sprinkler application Droughty Depth to bedrock	1.00 1.00 1.00 1.00 0.64 0.46
Masham-----	22	Very limited Slope Restricted permeability Depth to bedrock Droughty Depth to dense layer	1.00 1.00 1.00 1.00 1.00	Very limited Droughty Restricted permeability Depth to bedrock Low adsorption Slope	1.00 1.00 1.00 1.00 1.00	Very limited Droughty Restricted permeability Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 1.00

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GMLG: Lucien-----	21	Very limited Slope Restricted permeability Depth to bedrock Depth to dense layer Droughty	1.00 1.00 1.00 1.00 1.00 1.00	Very limited Restricted permeability Depth to bedrock Low adsorption Slope Droughty	1.00 1.00 1.00 1.00 1.00 1.00	Very limited Restricted permeability Depth to bedrock Too steep for surface application Too steep for sprinkler application Droughty	1.00 1.00 1.00 1.00 1.00 1.00 1.00
GohC: Goodnight-----	92	Very limited Filtering capacity Leaching limitation Droughty	1.00 0.45 0.01	Very limited Filtering capacity Droughty	1.00 0.01	Very limited Filtering capacity Droughty	1.00 0.01
GohE: Goodnight-----	92	Very limited Filtering capacity Leaching limitation Slope Droughty	1.00 0.45 0.16 0.01	Very limited Filtering capacity Slope Droughty	1.00 0.16 0.01	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application Droughty	1.00 1.00 0.40 0.01
GooE: Goodnight-----	92	Very limited Filtering capacity Leaching limitation Droughty	1.00 0.45 0.05	Very limited Filtering capacity Droughty	1.00 0.05	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application Droughty	1.00 1.00 0.10 0.05
GooG: Goodnight-----	92	Very limited Slope Filtering capacity Leaching limitation Droughty	1.00 1.00 0.45 0.07	Very limited Filtering capacity Slope Droughty	1.00 1.00 0.07	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application Droughty	1.00 1.00 1.00 1.00 0.07

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GraC: Grainola-----	88	Very limited Restricted permeability Runoff limitation Depth to bedrock Droughty	1.00  0.40 0.29 0.14	Very limited Restricted permeability Low adsorption Depth to bedrock Droughty	1.00  1.00 0.29 0.14	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application	1.00  0.29 0.14 0.08
GraD2: Grainola-----	89	Very limited Restricted permeability Runoff limitation Depth to bedrock	1.00  0.40 0.01	Very limited Restricted permeability Low adsorption Depth to bedrock	1.00  1.00 0.01	Very limited Restricted permeability Too steep for surface application Too steep for sprinkler application Depth to bedrock	1.00  0.92 0.02 0.01
GrHC: Grant-----	45	Very limited Restricted permeability	1.00	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
Huska-----	35	Very limited Restricted permeability Sodium content Droughty Runoff limitation Salinity	1.00  1.00 0.51 0.40 0.35	Very limited Restricted permeability Sodium content Low adsorption Droughty Salinity	1.00  1.00 1.00 0.51 0.01	Very limited Restricted permeability Sodium content Droughty Salinity	1.00  1.00 0.51 0.01
GrIE: Grainola-----	71	Very limited Restricted permeability Runoff Depth to bedrock	1.00  0.40 0.01	Very limited Low adsorption Restricted permeability Depth to bedrock	1.00 1.00 0.01	Very limited Restricted permeability Too steep for surface application Too steep for sprinkler application Depth to bedrock	1.00  1.00 0.10 0.01
Ironmound-----	20	Very limited Depth to bedrock Dense layer Droughty Filtering capacity	1.00 1.00 1.00 0.01	Very limited Depth to bedrock Low adsorption Droughty Filtering capacity	1.00 1.00 1.00 0.01	Very limited Depth to bedrock Droughty Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 1.00 1.00 0.10 0.01



## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrLE: Grainola-----	55	Very limited Restricted permeability Depth to bedrock Droughty Runoff limitation Slope	1.00  0.74 0.52 0.40 0.04	Very limited Restricted permeability Low adsorption Depth to bedrock Droughty Slope	1.00  1.00 0.74 0.52 0.04	Very limited Restricted permeability Too steep for surface application Depth to bedrock Droughty Too steep for sprinkler application	1.00  1.00   0.74 0.52 0.22
Lucien-----	26	Very limited Restricted permeability Depth to bedrock Droughty Depth to dense layer Slope	1.00  1.00 1.00 1.00 0.04	Very limited Droughty Restricted permeability Depth to bedrock Low adsorption Slope	1.00 1.00 1.00 1.00 0.04	Very limited Droughty Restricted permeability Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 0.22
HaGD4: Harrah-----	70	Somewhat limited Too acid Filtering capacity	0.08 0.01	Somewhat limited Too acid Filtering capacity	0.31 0.01	Somewhat limited Too steep for surface application Too acid Too steep for sprinkler application Filtering capacity	0.92  0.31 0.02 0.01
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Somewhat limited Too acid Filtering capacity	0.08 0.01	Somewhat limited Too acid Filtering capacity	0.31 0.01	Somewhat limited Too acid Too steep for surface application Filtering capacity	0.31 0.08 0.01
HarG: Harrah-----	86	Very limited Slope Too acid Filtering capacity	1.00 0.08 0.01	Very limited Slope Too acid Filtering capacity	1.00 0.31 0.01	Very limited Too steep for surface application Too steep for sprinkler application Too acid Filtering capacity	1.00  1.00  0.31 0.01

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	unit	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HawB: Hawley-----	94	Very limited Filtering capacity	1.00	Very limited Filtering capacity Flooding	1.00 0.40	Very limited Filtering capacity	1.00
ICGD3: Ironmound-----	40	Very limited Depth to bedrock Droughty Depth to dense layer Restricted permeability Filtering capacity	1.00 1.00 1.00 1.00 0.01	Very limited Droughty Depth to bedrock Low adsorption Restricted permeability Filtering capacity	1.00 1.00 1.00 1.00 0.01	Very limited Droughty Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92 0.02
Coyle-----	30	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.10 0.04	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.10 0.04	Very limited Restricted permeability Too steep for surface application Depth to bedrock Droughty Too steep for sprinkler application	1.00 0.92 0.10 0.04 0.02
Grainola-----	15	Very limited Restricted permeability Runoff limitation Droughty Depth to bedrock	1.00 0.40 0.30 0.16	Very limited Low adsorption Restricted permeability Droughty Depth to bedrock	1.00 1.00 0.30 0.16	Very limited Restricted permeability Too steep for surface application Droughty Depth to bedrock Too steep for sprinkler application	1.00 0.92 0.30 0.16 0.02
IrCE: Ironmound-----	53	Very limited Depth to bedrock Droughty Depth to dense layer Restricted permeability Slope	1.00 1.00 1.00 1.00 0.16	Very limited Droughty Depth to bedrock Low adsorption Restricted permeability Slope	1.00 1.00 1.00 1.00 0.16	Very limited Droughty Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 0.40

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	unit	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
IrCE: Coyle-----	22	Very limited Restricted permeability Depth to bedrock Droughty Slope	1.00  0.80 0.57 0.16	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty Slope	1.00 1.00 0.80 0.57 0.16	Very limited Too steep for surface application Restricted permeability Depth to bedrock Droughty Too steep for sprinkler application	1.00  1.00 0.80 0.57 0.40
IroC2: Ironmound-----	90	Very limited Depth to bedrock Depth to dense layer Restricted permeability Droughty	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Low adsorption Droughty Restricted permeability	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Droughty Restricted permeability Too steep for surface application	1.00 1.00 1.00 0.08
KgfB: Kingfisher-----	90	Very limited Restricted permeability Depth to bedrock	1.00 0.01	Very limited Low adsorption Restricted permeability Depth to bedrock	1.00 1.00 0.01	Very limited Restricted permeability Depth to bedrock	1.00 0.01
KinC2: Kingfisher-----	90	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.71 0.18	Very limited Low adsorption Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.71 0.18	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application	1.00 0.71 0.18 0.08
KonB: Konawa-----	96	Somewhat limited Too acid Filtering capacity	0.11 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01
KonD2: Konawa-----	96	Somewhat limited Too acid Filtering capacity	0.11 0.01	Somewhat limited Too acid Filtering capacity	0.42 0.01	Somewhat limited Too steep for surface application Too acid Filtering capacity	0.68 0.42 0.01

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KrdA, KrkB: Kirkland-----	90	Very limited Restricted permeability Runoff limitation Sodium content	1.00 0.40 0.32	Very limited Restricted permeability Low adsorption Sodium content	1.00 1.00 0.32	Very limited Restricted permeability Sodium content	1.00 0.32
LarA: Lawrie-----	94	Somewhat limited Flooding	0.60	Very limited Flooding	1.00	Somewhat limited Flooding	0.60
LawA: Lawrie-----	86	Not limited		Somewhat limited Flooding	0.40	Not limited	
LerA: Lebron-----	80	Very limited Filtering capacity Restricted permeability Depth to saturated zone Ponding Flooding	1.00 1.00 1.00 1.00 0.60	Very limited Filtering capacity Restricted permeability Depth to saturated zone Flooding Ponding	1.00 1.00 1.00 1.00 1.00	Very limited Filtering capacity Restricted permeability Depth to saturated zone Ponding Flooding	1.00 1.00 1.00 1.00 0.60
LitB: Littleaxe-----	80	Somewhat limited Too acid Filtering capacity	0.02 0.01	Very limited Low adsorption Too acid Filtering capacity	1.00 0.07 0.01	Somewhat limited Too acid Filtering capacity	0.07 0.01
LitC2: Littleaxe-----	80	Somewhat limited Too acid Filtering capacity	0.02 0.01	Very limited Low adsorption Too acid Filtering capacity	1.00 0.07 0.01	Somewhat limited Too steep for surface application Too acid Filtering capacity	0.08 0.07 0.01
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Very limited Restricted permeability Depth to bedrock Depth to dense layer Droughty Runoff limitation	1.00 1.00 1.00 1.00 1.00 0.40	Very limited Restricted permeability Depth to bedrock Low adsorption Droughty Slope	1.00 1.00 1.00 1.00 0.37	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 0.60

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaID: Ironmound-----	27	Very limited Depth to bedrock Droughty Depth to dense layer Restricted permeability Slope	1.00 1.00 1.00 1.00 0.16	Very limited Droughty Depth to bedrock Low adsorption Restricted permeability Slope	1.00 1.00 1.00 1.00 0.16	Very limited Droughty Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 0.40
MaIG: Masham-----	73	Very limited Slope Restricted permeability Depth to bedrock Droughty Depth to dense layer	1.00 1.00 1.00 1.00 1.00	Very limited Droughty Restricted permeability Depth to bedrock Low adsorption Slope	1.00 1.00 1.00 1.00 1.00	Very limited Droughty Restricted permeability Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00 1.00
Ironmound-----	17	Very limited Slope Depth to bedrock Depth to dense layer Restricted permeability Droughty	1.00 1.00 1.00 1.00 1.00	Very limited Depth to bedrock Low adsorption Slope Droughty Restricted permeability	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Droughty Restricted permeability	1.00 1.00 1.00 1.00 1.00
MinB: Minco-----	91	Not limited		Not limited		Not limited	
MinC: Minco-----	91	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
MinD: Minco-----	91	Not limited		Not limited		Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.02

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MinF: Minco-----	91	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for surface application Too steep for sprinkler application	1.00  1.00
M11A: Miller-----	95	Very limited Restricted permeability Flooding Runoff limitation	1.00 0.60 0.40	Very limited Restricted permeability Flooding	1.00 1.00	Very limited Restricted permeability Flooding	1.00 0.60
MulC: Mulhall-----	88	Very limited Restricted permeability	1.00	Very limited Low adsorption Restricted permeability	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
MulC2: Mulhall-----	88	Not limited		Very limited Low adsorption	1.00	Somewhat limited Too steep for surface application	0.08
NavA, NavB: Navina-----	96	Not limited		Not limited		Not limited	
NeGD4: Newalla-----	75	Very limited Restricted permeability Runoff limitation Too acid	1.00 0.40 0.08	Very limited Restricted permeability Low adsorption Too acid	1.00 1.00 0.31	Very limited Restricted permeability Too steep for surface application Too acid	1.00 0.32 0.31
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Very limited Restricted permeability Runoff limitation Too acid	1.00 0.40 0.08	Very limited Restricted permeability Low adsorption Too acid	1.00 1.00 0.31	Very limited Restricted permeability Too acid	1.00 0.31
NorA: Norge-----	93	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.31	Somewhat limited Restricted permeability	0.31
NorB: Norge-----	90	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.31	Somewhat limited Restricted permeability	0.31

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NorC2: Norge-----	88	Somewhat limited Restricted permeability	0.41	Somewhat limited Restricted permeability	0.31	Somewhat limited Restricted permeability Too steep for surface application	0.31 0.08
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Restricted permeability Sodium content Runoff limitation Salinity Droughty	1.00 1.00 0.40 0.35 0.09	Very limited Restricted permeability Sodium content Low adsorption Droughty Salinity	1.00 1.00 1.00 0.09 0.01	Very limited Restricted permeability Sodium content Droughty Salinity	1.00 1.00 0.09 0.01
PieB: Piedmont-----	92	Very limited Restricted permeability Runoff limitation Depth to bedrock Droughty	1.00 0.40 0.29 0.07	Very limited Restricted permeability Low adsorption Depth to bedrock Droughty	1.00 1.00 0.29 0.07	Very limited Restricted permeability Depth to bedrock Droughty	1.00 0.29 0.07
PieC2: Piedmont-----	93	Very limited Restricted permeability Depth to bedrock Droughty Runoff limitation	1.00 0.71 0.69 0.40	Very limited Restricted permeability Low adsorption Depth to bedrock Droughty	1.00 1.00 0.71 0.69	Very limited Restricted permeability Depth to bedrock Droughty Too steep for surface application	1.00 0.71 0.69 0.08
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA: Pulaski-----	85	Very limited Flooding Filtering capacity	1.00 0.01	Very limited Flooding Filtering capacity	1.00 0.01	Very limited Flooding Filtering capacity	1.00 0.01
PulA: Pulaski-----	85	Somewhat limited Flooding Filtering capacity	0.60 0.01	Very limited Flooding Filtering capacity	1.00 0.01	Somewhat limited Flooding Filtering capacity	0.60 0.01
RenB: Renfrow-----	89	Very limited Restricted permeability Runoff limitation	1.00 0.40	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability	1.00

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RenC: Renfrow-----	89	Very limited Restricted permeability Runoff limitation	1.00 0.40	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
RewC2: Renfrow-----	84	Very limited Restricted permeability Runoff limitation	1.00 0.40	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
RinB: Renthin-----	81	Very limited Restricted permeability Runoff limitation	1.00 0.40	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability	1.00
RnnC2: Renthin-----	80	Very limited Restricted permeability Runoff limitation	1.00 0.40	Very limited Restricted permeability Low adsorption	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
SDGD4: Stephenville-----	32	Very limited Depth to dense layer Depth to bedrock Droughty Restricted permeability Too acid	1.00 0.97 0.92 0.41 0.11	Very limited Low adsorption Depth to bedrock Droughty Too acid Restricted permeability	1.00 0.97 0.92 0.42 0.31	Somewhat limited Depth to bedrock Droughty Too steep for surface application Too acid Restricted permeability	0.97 0.92 0.92 0.42 0.31
Darsil-----	31	Very limited Filtering capacity Depth to bedrock Droughty	1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92 0.02
Gullied land-----	23	Not rated		Not rated		Not rated	



## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND: Stephenville-----	44	Somewhat limited Depth to bedrock Droughty Restricted permeability Too acid Filtering capacity	0.65 0.59 0.41 0.11 0.01	Very limited Low adsorption Depth to bedrock Droughty Too acid Restricted permeability	1.00 0.65 0.59 0.42 0.31	Somewhat limited Too steep for surface application Depth to bedrock Droughty Too acid Restricted permeability	0.92 0.65 0.59 0.42 0.31
Darsil-----	29	Very limited Filtering capacity Depth to bedrock Droughty	1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92 0.02
Newalla-----	21	Very limited Restricted permeability Runoff limitation Too acid	1.00 0.40 0.08	Very limited Restricted permeability Low adsorption Too acid	1.00 1.00 0.31	Very limited Restricted permeability Too steep for surface application Too acid Too steep for sprinkler application	1.00 0.92 0.31 0.02
SDND2: Stephenville-----	44	Somewhat limited Depth to bedrock Restricted permeability Droughty Too acid Filtering capacity	0.46 0.41 0.29 0.11 0.01	Very limited Low adsorption Depth to bedrock Too acid Restricted permeability Droughty	1.00 0.46 0.42 0.31 0.29	Somewhat limited Too steep for surface application Depth to bedrock Too acid Restricted permeability Droughty	0.92 0.46 0.42 0.31 0.29
Darsil-----	33	Very limited Filtering capacity Depth to bedrock Droughty	1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92 0.02

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND2: Newalla-----	20	Very limited Restricted permeability Runoff limitation Too acid	1.00 0.40 0.08	Very limited Restricted permeability Low adsorption Too acid	1.00 1.00 0.31	Very limited Restricted permeability Too steep for surface application Too acid Too steep for sprinkler application	1.00 0.92 0.31 0.02
SlaB: Slaughterville-----	95	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01
SlaD: Slaughterville-----	95	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Too steep for surface application Too steep for sprinkler application Filtering capacity	0.92 0.02 0.01
SlaF: Slaughterville-----	95	Somewhat limited Slope Filtering capacity	0.96 0.01	Somewhat limited Slope Filtering capacity	0.96 0.01	Very limited Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 0.98 0.01
StDC: Stephenville-----	55	Somewhat limited Depth to bedrock Droughty Restricted permeability Too acid Filtering capacity	0.46 0.43 0.41 0.11 0.01	Very limited Low adsorption Depth to bedrock Droughty Too acid Restricted permeability	1.00 0.46 0.43 0.42 0.31	Somewhat limited Depth to bedrock Droughty Too acid Restricted permeability Too steep for surface application	0.46 0.43 0.42 0.31 0.08
Darsil-----	30	Very limited Filtering capacity Depth to bedrock Droughty	1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock	1.00 1.00 1.00

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
StDC2: Stephenville-----	55	Somewhat limited Restricted permeability Too acid Depth to bedrock Filtering capacity	0.41  0.11 0.01 0.01	Very limited Low adsorption Too acid Restricted permeability Depth to bedrock Filtering capacity	1.00 0.42 0.31 0.01 0.01	Somewhat limited Too acid Restricted permeability Depth to bedrock Filtering capacity	0.42 0.31 0.01 0.01
Darsil-----	30	Very limited Filtering capacity Depth to bedrock Droughty	1.00  1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock	1.00 1.00 1.00
StDE: Stephenville-----	50	Somewhat limited Slope Depth to bedrock Droughty Restricted permeability Too acid	0.96 0.71 0.68 0.41 0.11	Very limited Low adsorption Slope Depth to bedrock Droughty Too acid	1.00 0.96 0.71 0.68 0.42	Very limited Too steep for surface application Too steep for sprinkler application Depth to bedrock Droughty Too acid	1.00   0.98  0.71 0.68 0.42
Darsil-----	40	Very limited Filtering capacity Depth to bedrock Droughty	1.00  1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Low adsorption	1.00 1.00 1.00 1.00	Very limited Droughty Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.92  0.02
SteB: Stephenville-----	94	Somewhat limited Restricted permeability Too acid Depth to bedrock Droughty Filtering capacity	0.41  0.11 0.10 0.05 0.01	Very limited Low adsorption Too acid Restricted permeability Depth to bedrock Droughty	1.00 0.42 0.31 0.10 0.05	Somewhat limited Too acid Restricted permeability Depth to bedrock Droughty Filtering capacity	0.42 0.31 0.10 0.05 0.01
SteC2: Stephenville-----	92	Somewhat limited Depth to bedrock Restricted permeability Droughty Too acid Filtering capacity	0.54 0.41  0.35 0.11 0.01	Very limited Low adsorption Depth to bedrock Too acid Droughty Restricted permeability	1.00 0.54 0.42 0.35 0.31	Somewhat limited Depth to bedrock Too acid Droughty Restricted permeability Too steep for surface application	0.54 0.42 0.35 0.31 0.08

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SUND: Stephenville-----	35	Somewhat limited Depth to bedrock Droughty Restricted permeability Too acid Filtering capacity	0.65 0.47 0.41 0.11 0.01	Very limited Low adsorption Depth to bedrock Droughty Too acid Restricted permeability	1.00 0.65 0.47 0.42 0.31	Somewhat limited Too steep for surface application Depth to bedrock Droughty Too acid Restricted permeability	0.92 0.65 0.47 0.42 0.31
Urban land-----	30	Not rated		Not rated		Not rated	
Newalla-----	15	Very limited Restricted permeability Runoff limitation Too acid	1.00 0.40 0.08	Very limited Restricted permeability Low adsorption Too acid	1.00 1.00 0.31	Very limited Restricted permeability Too steep for surface application Too acid Too steep for sprinkler application	1.00 0.92 0.31 0.02
TelB: Teller-----	96	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01
TelC2: Teller-----	96	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Too steep for surface application Filtering capacity	0.08 0.01
TriA: Tribbey-----	90	Very limited Flooding Depth to dense layer Depth to saturated zone Filtering capacity	1.00 1.00 1.00 0.01	Very limited Flooding Depth to saturated zone Filtering capacity	1.00 1.00 0.01	Very limited Flooding Depth to saturated zone Filtering capacity	1.00 1.00 0.01
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Somewhat limited Flooding Filtering capacity	0.60 0.01	Very limited Flooding Filtering capacity	1.00 0.01	Somewhat limited Flooding Filtering capacity	0.60 0.01

## Agricultural Waste Management, Part I-Continued

Map symbol and soil name	Pct. of map	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	unit	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZaHC: Zaneis-----	55	Very limited Restricted permeability Filtering capacity	1.00  0.01	Very limited Low adsorption Restricted permeability Filtering capacity	1.00 1.00 0.01	Very limited Restricted permeability Too steep for surface application Filtering capacity	1.00  0.08  0.01
Huska-----	25	Very limited Restricted permeability Sodium content Runoff limitation Salinity Droughty	1.00 1.00 0.40 0.35 0.15	Very limited Restricted permeability Sodium content Low adsorption Droughty Salinity	1.00 1.00 1.00 0.15 0.01	Very limited Restricted permeability Sodium content Droughty Too steep for surface application Salinity	1.00 1.00 0.15 0.08  0.01
ZanB: Zaneis-----	87	Very limited Restricted permeability	1.00	Very limited Low adsorption Restricted permeability	1.00 1.00	Very limited Restricted permeability	1.00
ZanC, ZanC2: Zaneis-----	87	Very limited Restricted permeability	1.00	Very limited Low adsorption Restricted permeability	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00  0.08

## Agricultural Waste Management, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AspA: Ashport-----	95	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Restricted permeability Flooding	1.00 0.60	Somewhat limited Flooding	0.60
AstA: Ashport-----	90	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Flooding Restricted permeability	1.00 1.00	Very limited Flooding	1.00
BetA: Bethany-----	93	Very limited Seepage Too level	1.00 0.50	Very limited Restricted permeability	1.00	Somewhat limited Restricted permeability	0.96
BetB: Bethany-----	93	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Restricted permeability	0.96
BocA: Bocox-----	94	Very limited Seepage Depth to saturated zone Ponding Too level	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Restricted permeability Ponding	1.00 1.00 1.00	Very limited Filtering capacity Depth to saturated zone Ponding	1.00 1.00 1.00
Bt1A: Bathel-----	94	Very limited Seepage Ponding Depth to saturated zone Too level	1.00 1.00 0.68 0.50	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 1.00	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 0.68
CaaA: Canadian-----	94	Very limited Seepage Too level Flooding	1.00 0.50 0.40	Somewhat limited Restricted permeability	0.31	Somewhat limited Filtering capacity	0.01
CAID: Coyle-----	31	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CAID: Ashport-----	28	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Flooding Restricted permeability	1.00 1.00	Very limited Flooding	1.00
Ironmound-----	22	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 0.99 0.92 0.06
CoIC2: Coyle-----	61	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
Ironmound-----	33	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
CoUB: Coyle-----	55	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability	1.00 1.00	Very limited Depth to bedrock	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
CoUC: Coyle-----	42	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability	1.00 0.99
Urban land-----	38	Not rated		Not rated		Not rated	
CoyB: Coyle-----	91	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability	1.00 0.99

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoyC2: Coyle-----	91	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
CoZC3: Coyle-----	70	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
Zaneis-----	15	Very limited Seepage Depth to bedrock	1.00 0.71	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Depth to bedrock Too steep for surface application	0.99 0.71 0.08
DAM: Dam-----	100	Not rated		Not rated		Not rated	
DerB: Derby-----	90	Very limited Seepage	1.00	Not limited		Very limited Filtering capacity	1.00
DerD: Derby-----	90	Very limited Seepage	1.00	Somewhat limited Slope	0.50	Very limited Filtering capacity Too steep for surface application	1.00 0.68
DerE: Derby-----	90	Very limited Seepage Too steep for surface application	1.00 1.00	Very limited Slope	1.00	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00



## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DiRG: Darsil-----	67	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 1.00	Very limited Slope Depth to bedrock Restricted permeability	1.00 1.00 1.00	Very limited Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
DouB: Dougherty-----	91	Very limited Seepage Too acid	1.00 0.42	Very limited Restricted permeability	1.00	Somewhat limited Too acid Filtering capacity	0.42 0.01
DouD: Dougherty-----	91	Very limited Seepage Too acid	1.00 0.42	Very limited Restricted permeability Slope	1.00 0.50	Somewhat limited Too steep for surface application Too acid Filtering capacity	0.68 0.42 0.01
DUM: Dumps-----	100	Not rated		Not rated		Not rated	
EasA: Easpur-----	93	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Restricted permeability Flooding	1.00 0.60	Somewhat limited Flooding	0.60
GadA: Gaddy-----	85	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Somewhat limited Flooding	0.60	Very limited Filtering capacity Flooding	1.00 0.60
GaGA: Gaddy-----	67	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Flooding Restricted permeability	1.00 0.31	Very limited Filtering capacity Flooding	1.00 1.00
Gracemore-----	23	Very limited Flooding Seepage Depth to saturated zone Too level	1.00 1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Restricted permeability	1.00 1.00 0.31	Very limited Depth to saturated zone Flooding Filtering capacity	1.00 1.00 0.01

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GMGE4: Grainola-----	40	Very limited Depth to bedrock Too steep for surface application Seepage	1.00 0.78   0.69	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00  1.00  0.78
Masham-----	30	Very limited Depth to bedrock Too steep for surface application	1.00 0.78	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.78
Gullied land-----	20	Not rated		Not rated		Not rated	
GMLG: Grainola-----	37	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 1.00	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 1.00
Masham-----	22	Very limited Depth to bedrock Too steep for surface application	1.00 1.00	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Restricted permeability	1.00 1.00 1.00 1.00
Lucien-----	21	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 1.00	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Restricted permeability Filtering capacity	1.00 1.00 1.00 1.00 0.01

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GohC: Goodnight-----	92	Very limited Seepage	1.00	Not limited		Very limited Filtering capacity	1.00
GohE: Goodnight-----	92	Very limited Seepage	1.00	Very limited Slope	1.00	Very limited Filtering capacity	1.00
		Too steep for surface application	0.78			Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
GooE: Goodnight-----	92	Very limited Seepage	1.00	Very limited Slope	1.00	Very limited Filtering capacity	1.00
		Too steep for surface application	0.22			Too steep for surface application	1.00
						Too steep for sprinkler application	0.22
GooG: Goodnight-----	92	Very limited Seepage	1.00	Very limited Slope	1.00	Very limited Filtering capacity	1.00
		Too steep for surface application	1.00			Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
GraC: Grainola-----	88	Very limited Depth to bedrock	1.00	Very limited Restricted permeability	1.00	Very limited Depth to bedrock	1.00
		Seepage	0.69	Depth to bedrock	1.00	Restricted permeability	1.00
						Too steep for surface application	0.08
GraD2: Grainola-----	89	Very limited Depth to bedrock	1.00	Very limited Restricted permeability	1.00	Very limited Depth to bedrock	1.00
		Seepage	0.69	Depth to bedrock	1.00	Restricted permeability	1.00
		Too steep for surface application	0.06	Slope	0.88	Too steep for surface application	0.92
						Too steep for sprinkler application	0.06

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrHC: Grant-----	45	Very limited Seepage Depth to bedrock	1.00 0.14	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock Too steep for surface application	1.00 0.14 0.08
Huska-----	35	Very limited Sodium content Seepage Depth to bedrock	1.00 1.00 0.42	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Sodium content Restricted permeability Depth to bedrock Salinity	1.00 1.00 0.42 0.01
GrIE: Grainola-----	71	Very limited Depth to bedrock Seepage Too steep for surface application	1.00 0.69 0.22	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Restricted permeability Too steep for sprinkler application	1.00 1.00 0.96 0.22
Ironmound-----	20	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.22	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 1.00 0.22 0.01
GrLE: Grainola-----	55	Very limited Depth to bedrock Seepage Too steep for surface application	1.00 0.69 0.50	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 1.00 1.00 0.50

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrLE: Lucien-----	26	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.50	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 1.00 1.00 0.50 0.01
HaGD4: Harrah-----	70	Very limited Seepage Too acid Too steep for surface application	1.00 0.31 0.06	Very limited Restricted permeability Slope	1.00 0.88	Somewhat limited Too steep for surface application Too acid Too steep for sprinkler application Filtering capacity	0.92 0.31 0.06 0.01
Gullied land-----	15	Not rated		Not rated		Not rated	
HarC, HarC2: Harrah-----	91	Very limited Seepage Too acid	1.00 0.31	Very limited Restricted permeability	1.00	Somewhat limited Too acid Too steep for surface application Filtering capacity	0.31 0.08 0.01
HarG: Harrah-----	86	Very limited Seepage Too steep for surface application Too acid	1.00 1.00 0.31	Very limited Restricted permeability Slope	1.00 1.00	Very limited Too steep for surface application Too steep for sprinkler application Too acid Filtering capacity	1.00 1.00 0.31 0.01
HawB: Hawley-----	94	Very limited Seepage Flooding	1.00 0.40	Very limited Restricted permeability	1.00	Very limited Filtering capacity	1.00

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ICGD3: Ironmound-----	40	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 0.99 0.92 0.06 0.01
Coyle-----	30	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 0.99 0.92 0.06
Grainola-----	15	Very limited Depth to bedrock Seepage Too steep for surface application	1.00 0.69 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	1.00 0.99 0.92 0.06
IrCE: Ironmound-----	53	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.78	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Restricted permeability Too steep for sprinkler application Filtering capacity	1.00 1.00 0.99 0.78 0.01
Coyle-----	22	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.78	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Restricted permeability Too steep for sprinkler application	1.00 1.00 0.99 0.78

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
IroC2: Ironmound-----	90	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
KgfB: Kingfisher-----	90	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability	1.00 0.99
KinC2: Kingfisher-----	90	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 0.99 0.08
KonB: Konawa-----	96	Very limited Seepage Too acid	1.00 0.42	Very limited Restricted permeability	1.00	Somewhat limited Too acid Filtering capacity	0.42 0.01
KonD2: Konawa-----	96	Very limited Seepage Too acid	1.00 0.42	Somewhat limited Restricted permeability Slope	0.61 0.50	Somewhat limited Too steep for surface application Too acid Filtering capacity	0.68 0.42 0.01
KrdA: Kirkland-----	90	Very limited Seepage Too level Sodium content	1.00 0.50 0.32	Very limited Restricted permeability	1.00	Very limited Restricted permeability Sodium content	1.00 0.32
KrkB: Kirkland-----	90	Somewhat limited Seepage Sodium content	0.69 0.32	Very limited Restricted permeability	1.00	Very limited Restricted permeability Sodium content	1.00 0.32
LarA: Lawrie-----	94	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Restricted permeability Flooding	1.00 0.60	Somewhat limited Flooding	0.60
LawA: Lawrie-----	86	Very limited Seepage Too level Flooding	1.00 0.50 0.40	Very limited Restricted permeability	1.00	Not limited	

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LerA: Lebron-----	80	Very limited Flooding Depth to saturated zone Ponding Too level	 1.00 1.00 1.00 0.50	Very limited Restricted permeability Depth to saturated zone Ponding Flooding	 1.00 1.00 1.00 0.60	Very limited Filtering capacity Depth to saturated zone Restricted permeability Ponding Flooding	 1.00 1.00 1.00 1.00 1.00 0.60
LitB: Littleaxe-----	80	Very limited Seepage Too acid Depth to bedrock	 1.00 0.07 0.01	Very limited Depth to bedrock Restricted permeability	 1.00 1.00	Somewhat limited Too acid Depth to bedrock Filtering capacity	 0.07 0.01 0.01
LitC2: Littleaxe-----	80	Very limited Seepage Depth to bedrock Too acid	 1.00 0.26 0.07	Very limited Depth to bedrock Restricted permeability	 1.00 1.00	Somewhat limited Depth to bedrock Too steep for surface application Too acid Filtering capacity	 0.26 0.08 0.07 0.01
M-W: Miscellaneous water-	100	Not rated		Not rated		Not rated	
MaID: Masham-----	52	Very limited Depth to bedrock Too steep for surface application	 1.00 0.94	Very limited Restricted permeability Depth to bedrock Slope	 1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application Too steep for sprinkler application	 1.00 1.00 1.00 0.94
Ironmound-----	27	Very limited Seepage Depth to bedrock Too steep for surface application	 1.00 1.00 0.78	Very limited Restricted permeability Depth to bedrock Slope	 1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Restricted permeability Too steep for sprinkler application	 1.00 1.00 0.99 0.78



## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaIG: Masham-----	73	Very limited Depth to bedrock Too steep for surface application	1.00 1.00	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Restricted permeability	1.00 1.00 1.00 1.00
Ironmound-----	17	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 1.00	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Restricted permeability	1.00 1.00 1.00 0.99
MinB: Minco-----	91	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Not limited	
MinC: Minco-----	91	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Too steep for surface application	0.08
MinD: Minco-----	91	Very limited Seepage Too steep for surface application	1.00 0.06	Very limited Restricted permeability Slope	1.00 0.88	Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.06
MinF: Minco-----	91	Very limited Seepage Too steep for surface application	1.00 1.00	Very limited Slope Restricted permeability	1.00 1.00	Very limited Too steep for surface application Too steep for sprinkler application	1.00 1.00
M11A: Miller-----	95	Very limited Flooding Too level	1.00 0.50	Very limited Restricted permeability Flooding	1.00 0.60	Very limited Restricted permeability Flooding	1.00 0.60

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MulC: Mulhall-----	88	Very limited Seepage	1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Too steep for surface application	0.99 0.08
MulC2: Mulhall-----	88	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Too steep for surface application	0.08
NavA: Navina-----	96	Very limited Seepage Too level	1.00 0.50	Very limited Restricted permeability	1.00	Not limited	
NavB: Navina-----	96	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Not limited	
NeGD4: Newalla-----	75	Very limited Seepage Depth to bedrock Too acid	1.00 0.77 0.31	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.12	Very limited Restricted permeability Depth to bedrock Too steep for surface application Too acid	1.00 0.77 0.32 0.31
Gullied land-----	15	Not rated		Not rated		Not rated	
NewB: Newalla-----	90	Very limited Seepage Depth to bedrock Too acid	1.00 0.77 0.31	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock Too acid	1.00 0.77 0.31
NorA: Norge-----	93	Very limited Seepage Too level	1.00 0.50	Very limited Restricted permeability	1.00	Somewhat limited Restricted permeability	0.21
NorB: Norge-----	90	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Restricted permeability	0.21
NorC2: Norge-----	88	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Restricted permeability Too steep for surface application	0.21 0.08

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
OWHD: Oil waste land-----	50	Not rated		Not rated		Not rated	
Huska-----	30	Very limited Sodium content Seepage	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Sodium content Restricted permeability Salinity	1.00 1.00 0.01
PieB: Piedmont-----	92	Very limited Depth to bedrock Seepage	1.00 0.69	Very limited Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability	1.00 1.00
PieC2: Piedmont-----	93	Very limited Depth to bedrock Seepage	1.00 0.69	Very limited Restricted permeability Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Restricted permeability Too steep for surface application	1.00 1.00 0.08
PIT: Pits-----	100	Not rated		Not rated		Not rated	
PukA: Pulaski-----	85	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Very limited Flooding Restricted permeability	1.00 0.31	Very limited Flooding Filtering capacity	1.00 0.01
PulA: Pulaski-----	85	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Somewhat limited Flooding Restricted permeability	0.60 0.31	Somewhat limited Flooding Filtering capacity	0.60 0.01
RenB: Renfrow-----	89	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00
RenC: Renfrow-----	89	Very limited Seepage	1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08
RewC2: Renfrow-----	84	Somewhat limited Seepage	0.69	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Too steep for surface application	1.00 0.08

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RinB: Renthin-----	81	Very limited Seepage Depth to bedrock	1.00 0.14	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 0.14
RnnC2: Renthin-----	80	Very limited Seepage Depth to bedrock	1.00 0.42	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Restricted permeability Depth to bedrock Too steep for surface application	1.00 0.42 0.08
SDGD4: Stephenville-----	32	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 1.00 0.42 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Too steep for surface application Too acid Restricted permeability Too steep for sprinkler application	1.00 0.92 0.42 0.21 0.06
Darsil-----	31	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00 0.88	Very limited Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.92 0.06
Gullied land-----	23	Not rated		Not rated		Not rated	
SDND: Stephenville-----	44	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 1.00 0.42 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Too steep for surface application Too acid Restricted permeability Too steep for sprinkler application	1.00 0.92 0.42 0.21 0.06

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SDND: Darsil-----	29	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00 0.88	Very limited Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.92 0.06
Newalla-----	21	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 0.61 0.31 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Restricted permeability Too steep for surface application Depth to bedrock Too acid Too steep for sprinkler application	1.00 0.92 0.61 0.31 0.06
SDND2: Stephenville-----	44	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 1.00 0.42 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Depth to bedrock Too steep for surface application Too acid Restricted permeability Too steep for sprinkler application	1.00 0.92 0.42 0.21 0.06
Darsil-----	33	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00 0.88	Very limited Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.92 0.06
Newalla-----	20	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 1.00 0.31 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Restricted permeability Depth to bedrock Too steep for surface application Too acid Too steep for sprinkler application	1.00 1.00 0.92 0.31 0.06

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SlaB: Slaughterville-----	95	Very limited Seepage	1.00	Somewhat limited Restricted permeability	0.31	Somewhat limited Filtering capacity	0.01
SlaD: Slaughterville-----	95	Very limited Seepage	1.00	Somewhat limited Slope	0.88	Somewhat limited Too steep for surface application	0.92
		Too steep for surface application	0.06	Restricted permeability	0.31	Too steep for sprinkler application	0.06
						Filtering capacity	0.01
SlaF: Slaughterville-----	95	Very limited Seepage	1.00	Very limited Slope	1.00	Very limited Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.31	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
StDC: Stephenville-----	55	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Very limited Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too acid	0.42
		Too acid	0.42			Restricted permeability	0.21
						Too steep for surface application	0.08
						Filtering capacity	0.01
Darsil-----	30	Very limited Seepage	1.00	Very limited Depth to bedrock	1.00	Very limited Filtering capacity	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
StDC2: Stephenville-----	55	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Very limited Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too acid	0.42
		Too acid	0.42			Restricted permeability	0.21
						Filtering capacity	0.01
Darsil-----	30	Very limited Seepage	1.00	Very limited Depth to bedrock	1.00	Very limited Filtering capacity	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Depth to bedrock	1.00

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
StDE: Stephenville-----	50	Very limited Seepage Depth to bedrock Too steep for surface application Too acid	1.00 1.00 1.00   0.42	Very limited Slope Restricted permeability Depth to bedrock	1.00 1.00 1.00  1.00	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Too acid Restricted permeability	1.00 1.00  1.00  0.42 0.21
Darsil-----	40	Very limited Seepage Depth to bedrock Too steep for surface application	1.00 1.00 0.06	Very limited Depth to bedrock Restricted permeability Slope	1.00 1.00  0.88	Very limited Filtering capacity Depth to bedrock Too steep for surface application Too steep for sprinkler application	1.00  1.00 0.92  0.06
SteB: Stephenville-----	94	Very limited Seepage Depth to bedrock Too acid	1.00 1.00 0.42	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Too acid Restricted permeability Filtering capacity	1.00 0.42 0.21  0.01
SteC2: Stephenville-----	92	Very limited Seepage Depth to bedrock Too acid	1.00 1.00 0.42	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Too acid Restricted permeability Too steep for surface application Filtering capacity	1.00 0.42 0.21  0.08 0.01
SUND: Stephenville-----	35	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	1.00 1.00 0.42 0.06	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 1.00 0.88	Very limited Depth to bedrock Too steep for surface application Too acid Restricted permeability Too steep for sprinkler application	1.00 0.92  0.42 0.21 0.06
Urban land-----	30	Not rated		Not rated		Not rated	

## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SUND: Newalla-----	15	Very limited Seepage Too acid Too steep for surface application Depth to bedrock	1.00 0.31 0.06 0.01	Very limited Restricted permeability Depth to bedrock Slope	1.00 1.00 0.88	Very limited Restricted permeability Too steep for surface application Too acid Too steep for sprinkler application Depth to bedrock	1.00 0.92 0.31 0.06 0.01
TelB: Teller-----	96	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Filtering capacity	0.01
TelC2: Teller-----	96	Very limited Seepage	1.00	Very limited Restricted permeability	1.00	Somewhat limited Too steep for surface application Filtering capacity	0.08 0.01
TriA: Tribbey-----	90	Very limited Flooding Seepage Depth to saturated zone Too level	1.00 1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Restricted permeability	1.00 1.00 0.31	Very limited Flooding Depth to saturated zone Filtering capacity	1.00 1.00 0.01
URB: Urban land-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	
YaaA, YahA: Yahola-----	87	Very limited Flooding Seepage Too level	1.00 1.00 0.50	Somewhat limited Flooding Restricted permeability	0.60 0.31	Somewhat limited Flooding Filtering capacity	0.60 0.01
ZaHC: Zaneis-----	55	Very limited Seepage Depth to bedrock	1.00 0.26	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Depth to bedrock Too steep for surface application Filtering capacity	0.99 0.26 0.08 0.01



## Agricultural Waste Management, Part II--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZaHC: Huska-----	25	Very limited Sodium content Seepage	1.00 1.00	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Very limited Sodium content Restricted permeability Too steep for surface application Salinity	1.00 1.00 0.08 0.01
ZanB: Zaneis-----	87	Very limited Seepage Depth to bedrock	1.00 0.88	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Depth to bedrock	0.99 0.88
ZanC: Zaneis-----	87	Very limited Seepage Depth to bedrock	1.00 0.71	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Depth to bedrock Too steep for surface application	0.99 0.71 0.08
ZanC2: Zaneis-----	87	Very limited Seepage Depth to bedrock	1.00 0.05	Very limited Restricted permeability Depth to bedrock	1.00 1.00	Somewhat limited Restricted permeability Too steep for surface application Depth to bedrock	0.99 0.08 0.05

# Soil Properties

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Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering Index Properties

The table "Engineering Index Properties" gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the section "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (1) and the Unified soil classification system (2).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil

that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.



Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--					Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200			
											Pct		
BetA: Bethany-----	In											Pct	
	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	0	100	100	96-100	80-98	21-37	2-13
	8-18	Silt loam, silty clay loam	CL	A-6, A-7	0	0	0	100	100	96-100	80-98	33-43	12-26
	18-28	Silty clay loam, clay loam	CL	A-6, A-7	0	0	0	100	100	96-100	80-98	33-43	12-26
	28-46	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
	46-62	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
BetB: Bethany-----	62-80	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	0	100	100	96-100	80-98	21-37	2-13
	10-22	Silty clay loam, clay loam	CL	A-6, A-7	0	0	0	100	100	96-100	80-98	33-43	12-26
	22-31	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
	31-51	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
	51-74	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34
	74-80	Silty clay loam, clay, silty clay, clay loam	CH, CL	A-6, A-7	0	0	0	100	96-100	96-100	90-99	37-60	15-34

## Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
BocA: Bocox-----	0-11	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	11-20	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	20-33	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	33-52	Sandy clay loam, fine	CL, CL-ML, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	52-65	Fine sandy loam, sandy	CL, CL-ML, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
Bt1A: Bathel-----	65-80	Fine sandy loam, sandy clay loam	CL, CL-ML, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	0-12	Loamy sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	12-18	Fine sandy loam, loamy fine sand	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-60	0-26	NP-7
	18-22	Sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-65	25-37	7-16
	22-45	Sandy clay loam, fine sandy loam, sandy clay	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	0	100	98-100	90-100	36-75	14-45	NP-22
	45-80	Fine sandy loam, sandy loam, loamy fine sand	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-60	0-26	NP-7











Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
DerB: Derby-----	0-11	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	11-30	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	30-52	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	52-84	Stratified fine sand to loamy fine sand to fine sandy loam, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
DerD: Derby-----	0-9	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	9-23	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	23-49	Loamy fine sand, fine sand	SP-SM, SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	49-80	Stratified fine sand to loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
DerE: Derby-----	0-11	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	11-20	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	20-38	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	38-54	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP
	54-80	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-0	NP

## Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments			Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches		4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>						<u>Pct</u>	
DiRG: Darsil-----	0-4	Loamy fine sand	SM	A-2	0	0		98-100	98-100	85-100	15-35	0-14	NP
	4-16	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0		75-100	70-100	50-100	3-35	0-14	NP
	16-24	Bedrock			---	---		---	---	---	---	---	---
Rock outcrop.													
DouB: Dougherty-----	0-13	Loamy fine sand	SM	A-2	0	0		100	100	90-100	15-35	0-14	NP
	13-26	Fine sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0		100	100	82-100	3-35	0-14	NP
	26-43	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0		100	100	90-100	36-65	20-37	3-16
	43-52	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0		100	100	90-100	36-65	20-37	3-16
	52-64	Fine sandy loam, sandy clay loam, loamy fine sand	CL, ML, SC, SM	A-2, A-4, A-6	0	0		100	100	90-100	15-65	15-37	NP-16
DouD: Dougherty-----	64-80	Loamy fine sand, fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0		100	100	90-100	15-60	15-26	NP-7
	0-9	Loamy fine sand	SM	A-2	0	0		100	100	90-100	15-35	0-14	NP
	9-22	Fine sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0		100	100	82-100	3-35	0-14	NP
	22-32	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0		100	100	90-100	36-65	20-37	3-16
	32-44	Fine sandy loam, sandy clay loam, loamy fine sand	CL, ML, SC, SM	A-2, A-4, A-6	0	0		100	100	90-100	15-65	15-37	NP-16
DouD: Dougherty-----	44-80	Loamy fine sand, fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0		100	100	90-100	15-60	15-26	NP-7





Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments			Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	inches >10  Pct	3-10 inches  Pct	4	10	40	200			
GMLG: Masham-----	In										Pct		
	0-4 4-13	Silty clay loam Silty clay loam, silty clay, clay	CL CH, CL	A-6, A-7 A-6, A-7	0 0	0 0	90-100 90-100	85-100 90-100	80-100 85-100	70-98 80-99	37-50 37-60	15-26 15-34	
	13-25	Bedrock			---	---	---	---	---	---	---	---	
	0-6	Loam	CL, CL-ML, ML, SM	A-4, A-6	0	0-15	85-100	85-100	80-100	42-97	22-31	2-13	
	6-17	Loam, very fine sandy loam, fine sandy loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-20	85-100	85-100	80-100	30-97	14-37	NP-14	
GohC: Goodnight-----	17-30	Bedrock			---	---	---	---	---	---	---	---	
	0-9 9-18	Loamy fine sand Loamy fine sand, fine sand	SM SM, SP-SM	A-2 A-2, A-3	0 0	0	100 100	98-100 98-100	90-100 82-100	15-35 3-35	0-14 0-14	NP NP	
	18-25	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-14	NP	
	25-64	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-14	NP	
	64-80	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-14	NP	
GohE: Goodnight-----	0-10 10-22	Loamy fine sand Loamy fine sand, fine sand	SM SM, SP-SM	A-2 A-2, A-3	0 0	0	100 100	98-100 98-100	90-100 82-100	15-35 3-35	0-14 0-14	NP NP	
	22-32	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-14	NP	
	32-52	Loamy fine sand, fine sand	SM, SP-SM	A-3, A-2	0	0	100	98-100	82-100	3-35	0-14	NP	
	52-80	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	3-35	0-14	NP	















Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
Kgfb: Kingfisher-----	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	10-22	Silty clay loam, clay loam	CL	A-7, A-6	0	0	100	100	96-100	80-98	33-43	12-20
	22-32	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	33-60	12-35
	32-38	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	33-60	12-35
KinC2: Kingfisher-----	38-40	Bedrock			---	---	---	---	---	---	---	---
	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	65-85	24-37	4-14
	8-13	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	13-20	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	20-27	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	33-60	12-35
	27-40	Bedrock			---	---	---	---	---	---	---	---

Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
KonB: Konawa-----	0-7	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	7-12	Fine sand, loamy fine sand, fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-3, A-4	0	0	100	98-100	82-100	3-60	0-26	NP-7
	12-25	Sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	25-38	Sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	38-52	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	52-80	Loamy fine sand, sandy clay loam, fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16
KonD2: Konawa-----	0-9	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	9-23	Sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	23-38	Sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	38-49	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	49-70	Fine sandy clay loam, loamy fine sand	CL-ML, ML, SC-SM, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16
	70-80	Fine sandy loam, sandy clay loam, loamy fine sand	CL-ML, ML, SC-SM, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16

Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
KrdA: Kirkland-----	In										Pct	
	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	8-19	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	19-41	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	41-59	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	59-85	Clay, silty clay, clay loam	CH, CL	A-7	0	0	100	100	96-100	76-99	41-70	26-45
KrkB: Kirkland-----	85-96	Bedrock			---	---	---	---	---	---	---	---
	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	90-98	33-42	12-19
	9-34	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	34-48	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	48-57	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	57-82	Clay, silty clay, clay loam	CH, CL	A-7	0	0	100	100	96-100	76-99	41-70	26-45
LarA: Lawrie-----	82-98	Bedrock			---	---	---	---	---	---	---	---
	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-98	22-37	2-14
	8-20	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-98	22-37	2-14
	20-27	Silty clay loam, silt loam	CL	A-7, A-4, A-6	0	0	100	100	96-100	65-98	30-43	8-19
	27-38	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	38-45	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
45-80	Loam, clay loam, silty clay loam	CL, SC	A-4, A-6, A-7	0	0	100	100	90-100	36-98	30-50	9-26	









## Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
MinC: Minco-----	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
	0-10	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	51-75	14-28	NP-7
	10-29	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	29-40	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	40-54	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
MinD: Minco-----	54-80	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	0-12	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	51-75	14-28	NP-7
	12-26	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	26-47	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	47-67	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	67-80	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10

Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MinF: Minco-----	0-9	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	51-75	14-28	NP-7
	9-19	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	19-39	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	39-64	Loam, silt loam, very fine sandy loam	ML, CL, CL-ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	64-70	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
M11A: Miller-----	70-80	Loam, silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	14-31	NP-10
	0-9	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	9-15	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	20-40
	15-27	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	98-100	90-99	41-65	20-40
	27-41	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	80-99	35-60	15-35
	41-55	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	80-99	35-60	15-35
	55-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	80-99	35-60	15-35



Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
NavA:												
Navina-----												
	0-8	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-60	14-26	NP-7
	8-14	Fine sandy loam, clay loam, sandy clay loam, loam	SM, SC, CL, ML	A-4, A-6, A-7	0	0	100	98-100	94-100	36-85	14-43	NP-20
	14-33	Sandy clay loam, clay loam, fine sandy loam	SM, SC, ML, CL	A-4, A-6, A-7	0	0	100	98-100	94-100	36-85	14-43	NP-20
	33-41	Sandy clay loam, clay loam, fine sandy loam	SM, SC, ML, CL	A-4, A-6, A-7	0	0	100	98-100	94-100	36-85	14-43	NP-20
	41-71	Fine sandy loam, sandy clay loam, loam	CL-ML, ML, SC-SM, SM	A-4, A-6, A-7	0	0	100	98-100	94-100	36-85	14-43	NP-18
	71-80	Loamy fine sand, fine sandy loam, loam	SC-SM, SM, ML, CL-ML	A-2, A-4, A-6	0	0	100	98-100	96-100	15-85	0-31	NP-13





Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
NewB: Newalla-----	0-6	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	6-12	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	12-19	Sandy clay loam, clay loam	SC, CL	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	19-41	Clay, silty clay	CL, CH	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	41-46	Clay, very gravelly silty clay, silty clay, sandy clay	SC, CH, GC, CL	A-2, A-6, A-7	0	0	40-100	35-100	30-100	15-99	35-60	14-34
	46-52	Bedrock			---	---	---	---	---	---	---	---
NorA: Norge-----	0-11	Silt loam	ML, CL-ML, CL	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	11-16	Silt loam	CL-ML, ML, CL	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	16-23	Silt loam, clay loam, silty clay loam	CL, CL-ML, ML	A-4, A-6, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	23-43	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	43-61	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	61-80	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22

## Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
NorB: Norge-----	0-12	Silt loam	ML, CL-ML, CL	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	12-18	Silt loam, clay loam, silty clay loam	ML, CL-ML, CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	18-24	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	24-45	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	45-62	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
	62-80	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
NorC2: Norge-----	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	8-15	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	15-33	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	33-43	Silty clay loam, clay loam	CL	A-7, A-6	0	0	100	100	96-100	80-98	33-43	12-20
	43-65	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
	65-80	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22

Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments			Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200			
OWHD: Oil waste land.  Huska-----	In				Pct	Pct					Pct		
	0-8	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	94-100	51-97	24-37	5-14	
	8-19	Silty clay loam, silty clay, clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	19-40	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	40-51	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	51-59	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
PieB: Piedmont-----	59-80	Bedrock			---	---	---	---	---	---	---	---	
	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20	
	8-17	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	17-27	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	27-32	Silty clay loam, silty clay, clay, gravelly silty clay	CL, GC, SC, CH	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34	
	32-40	Bedrock			---	---	---	---	---	---	---	---	
PieC2: Piedmont-----	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20	
	7-14	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34	
	14-27	Clay, silty clay, gravelly silty clay	CH, CL, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34	
	27-40	Bedrock			---	---	---	---	---	---	---	---	







Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
SDND: Darsil-----	In				Pct	Pct					Pct	
	0-5	Fine sandy loam	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	5-18	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	3-35	0-14	NP
	18-20	Bedrock			---	---	---	---	---	---	---	---
	0-4	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
Newalla-----	4-8	Fine sandy loam	ML, SM, SC-SM, CL-ML	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	8-13	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	13-27	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	27-48	Clay, very gravelly silty clay, silty clay, sandy clay	CH, CL, SC, GC	A-2, A-6, A-7	0	0	40-100	35-100	30-100	15-99	35-60	14-34
	48-80	Bedrock			---	---	---	---	---	---	---	---
SDND2: Stephenville----	0-7	Fine sandy loam	SM, CL-ML, ML, SC-SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	7-12	Sandy clay loam, fine sandy loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	12-25	Sandy clay loam, fine sandy loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	25-30	Sandy clay loam, fine sandy loam	CL-ML, SC-SM, SC, CL	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	30-36	Bedrock			---	---	---	---	---	---	---	---
Darsil-----	0-6	Fine sandy loam	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	6-11	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	3-35	0-14	NP
	11-24	Bedrock			---	---	---	---	---	---	---	---















Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
ZaHC: Huska-----	<u>In</u>					<u>Pct</u>	<u>Pct</u>				<u>Pct</u>	
	0-5	loam	CL, CL-ML	A-4, A-6	0	0	100	100	94-100	51-97	24-37	5-14
	5-13	Clay, silty clay, clay loam, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	13-20	Clay, silty clay, clay loam, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	20-39	Clay loam, silty clay, silty clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	39-59	Clay loam, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	59-67	Bedrock			---	---	---	---	---	---	---	---
ZanB: Zaneis-----	0-10	Loam	CL	A-4, A-6	0	0	100	98-100	91-100	65-85	30-35	9-13
	10-17	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	17-28	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	28-38	Clay loam, sandy clay loam	SC, CL	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	38-44	Sandy clay loam, clay loam, fine sandy loam	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	0	0-10	90-100	90-100	85-100	30-90	20-40	4-18
	44-54	Bedrock			---	---	---	---	---	---	---	---



## Engineering Index Test Data

The table “Engineering Index Test Data of Selected Soils” shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series and are described in the section “Soil Series and Their Morphology.” The soil samples were tested by the Oklahoma Department of Transportation, Materials Division.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); liquid limit—T 89 (AASHTO), D 423 (ASTM); plasticity index—T 90 (AASHTO), D 424 (ASTM), D 1883 (ASTM); and shrinkage—T 92 (AASHTO), D 427 (ASTM).



## Engineering Index Test Data of Selected Soils

(The location of the sampled pedons is given at the end of the table. Dashes indicate that data were not available. RN means report number; LL, liquid limit; PI, plasticity index; and NP, nonplastic)

Soil name and sample number	Parent material	RN	Depth	Horizon	Shrinkage		Percentage passing sieve--			Percentage smaller than--		LL	PI	Classification	
					Limit	Ratio	No. 10	No. 40	No. 200	0.05 mm	0.002 mm			AASHTO	Unified
			In									Pct			
Coyle loam: (S910K-083-001)	Sandstone	6499	0-5	A-Bt	---	---	100	100	64	48	11	8	NP	A-4	---
		6500	5-18	Bt-R	16	1.84	100	100	56	46	23	20	27	10	A-4
Kirkland silt loam: (S910K-083-005)	Alluvium over shale	6501	0-8	Ap	16	1.83	100	100	95	79	29	25	33	14	A-6
		6502	8-40	Bt-Btk	9	2.08	100	99	96	88	48	42	55	36	A-7-6
		6353	50-73	2Bt5-2Bt6	---	---	100	99	94	89	55	51	61	43	A-6-7
Lebron clay: (S920K-083-004)	Clayey over sandy alluvium	---	9-18	A-C1	---	---	100	100	99	100	78	67	61	49	A-6-7
Masham silty clay loam: (S910K-083-008)	Mudstone	6503	0-4	A	18	1.88	91	86	76	71	39	32	40	18	A-6
		6504	4-13	Bw-BC	14	1.99	99	98	89	81	45	33	38	20	A-6
Mulhall loam: (S910K-083-006)	Colluvium from sandstone	6505	0-11	A	18	1.75	100	100	65	52	23	20	31	10	A-6
		6506	17-40	Bt	15	1.88	100	100	62	54	31	25	38	21	A-6
		6507	40-65	2Bt	17	1.83	100	100	56	45	27	26	35	18	A-6
Zaneis fine sandy loam: (S910K-083-003)	Sandstone	6352	11-35	Bt	---	---	100	100	51	46	31	29	33	16	A-6

## Location of sampled pedons:

Coyle loam; about 1,450 feet east and 1,600 north of the southwest corner of sec. 34, T. 17 N., R. 2 W. (The data reflect that the surface layer is slightly outside the range of a loam texture, but the data is within normal laboratory error.)

Kirkland silt loam; about 1,000 feet north and 150 feet west of the southeast corner of sec. 36, T. 16 N., R. 4 W. (The reaction is slightly outside of the range of the series because of the addition of acid-forming fertilizer.)

Lebron clay; about 3,800 feet east and 1,200 feet south of the northwest corner of sec. 9, T. 17 N., R. 2 W. (This is the type location for the series.)

Masham silty clay loam; about 1,200 feet east and 300 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W. Mulhall loam; about 1,250 feet east and 800 feet south of the northwest corner of sec. 19, R. 19 N., T. 2 W.

Zaneis fine sandy loam; about 5,000 feet west and 2,500 feet north of the southeast corner of sec. 30, T. 18 N., R. 2 W. (The surface layer of fine sandy loam is not typical for the map unit ZanB but is within the range of the Zaneis series. This pedon is an inclusion to the map unit ZanB.)

## Physical Properties

The table "Physical Properties of the Soils" shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the section "Soil Series and Their Morphology."

*Sand* as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. The estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. The estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In the table "Physical Properties of the Soils," the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability* ( $K_{sat}$ ) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity ( $K_{sat}$ ). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at  $\frac{1}{3}$ - or  $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as

percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. The estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

*Erosion factors.*—Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion.

*Erosion factor K<sub>f</sub>* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. This is one of the factors used in the Revised Universal Soil Loss Equation.

*Erosion factor T* is an estimate of the maximum annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gulying, and the value of nutrients lost through erosion.

*Wind erodibility groups.*—Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEGs) having similar percentages of dry soil aggregates larger than 0.84 millimeter.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

WEG 1. Very fine sand, fine sand, sand, and coarse sand.

WEG 2. Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, ash, and sapric organic soil material.

WEG 3. Very fine sandy loam, fine sandy loam, sandy loam, and coarse sandy loam.

WEG 4. Clay, silty clay, and noncalcareous clay loam and silty clay loam with more than 35 percent clay.

WEG 4L. Calcareous loam, silt loam, clay loam, and silty clay loam characterized by a strongly or violently effervescent reaction to cold dilute (1N) HCl.

WEG 5. Noncalcareous loam and silt loam with less than 20 percent clay and sandy clay loam, sandy clay, and hemic organic soil material.

WEG 6. Noncalcareous loam and silt loam with more than 20 percent clay and noncalcareous clay loam with less than 35 percent clay.

WEG 7. Silt, noncalcareous silty clay loam with less than 35 percent clay, and fibric organic soil material.

WEG 8. Soils that are not susceptible to soil blowing because of rock fragments on the surface or because of surface wetness.

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to soil blowing, or the tons per acre per year that can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

Additional information about wind erodibility groups and K, Kf, and T factors can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
									K	Kf	T		
AspA: Ashport-----	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct					
	0-10	0-50	50-88	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	.37	.37	5	6	48
	10-22	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	22-44	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	44-80	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
AstA: Ashport-----	0-11	0-50	50-88	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	.37	.37	5	6	48
	11-30	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	30-36	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	36-52	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	52-67	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
Beta: Bethany-----	67-80	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	.37	.37			
	0-8	0-50	50-82	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	.43	.43	5	5	56
	8-18	0-32	40-82	18-32	1.45-1.70	0.2-0.6	0.16-0.22	3.0-5.9	.37	.37			
	18-28	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.16-0.22	3.0-5.9	.37	.37			
	28-46	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
BetB: Bethany-----	46-62	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
	62-80	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
	0-10	0-32	50-82	18-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	.43	.43	5	5	56
	10-22	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.16-0.22	3.0-5.9	.37	.37			
	22-31	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
BocA: Bocox-----	31-51	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
	51-74	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
	74-80	0-45	0-65	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	.37	.37			
	0-11	70-90	0-30	2-10	1.35-1.50	6-20	0.07-0.11	0.0-2.9	.20	.20	5	2	134
	11-20	70-90	0-30	2-10	1.60-1.70	6-20	0.07-0.11	0.0-2.9	.20	.20			
	20-33	70-90	0-30	2-10	1.60-1.70	6-20	0.07-0.11	0.0-2.9	.20	.20			
	33-52	45-80	0-27	18-35	1.50-1.70	0.6-2	0.11-0.17	0.0-2.9	.32	.32			
	52-65	45-80	0-27	15-35	1.50-1.70	0.6-2	0.11-0.17	0.0-2.9	.32	.32			
	65-80	45-80	0-27	15-35	1.50-1.70	0.6-2	0.11-0.17	0.0-2.9	.32	.32			

Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
Bt1A: Bathel-----	0-12	70-90	0-30	2-10	1.35-1.50	6-20	0.06-0.10	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	12-18	43-90	0-50	2-18	1.30-1.70	2-20	0.07-0.15	0.0-2.9	0.5-1.0	.20	.20			
	18-22	45-80	0-27	20-35	1.60-1.65	0.6-2	0.12-0.17	0.0-2.9	0.5-1.0	.32	.32			
	22-45	45-80	0-27	18-45	1.35-1.70	0.2-6	0.11-0.18	3.0-5.9	0.0-0.5	.32	.32			
	45-80	43-90	0-50	2-18	1.50-1.70	2-20	0.07-0.15	0.0-2.9	0.0-0.5	.24	.24			
CaaA: Canadian-----	0-10	43-85	0-50	5-18	1.40-1.65	2-6	0.10-0.15	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	10-19	43-85	0-50	5-18	1.40-1.65	2-6	0.10-0.15	0.0-2.9	1.0-3.0	.20	.20			
	19-31	32-85	0-50	10-18	1.35-1.70	2-6	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	31-41	32-85	0-50	10-18	1.35-1.70	2-6	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	41-55	32-90	0-50	5-18	1.40-1.70	2-20	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
	55-80	32-90	0-50	5-18	1.40-1.70	2-20	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
CA1D: Coyle-----	0-10	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	10-19	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	19-36	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32			
	36-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
Ashport-----	0-11	0-50	50-88	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	11-26	0-53	40-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	26-46	0-53	40-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	46-63	0-53	40-82	18-35	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	63-80	0-90	0-73	5-40	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
Ironmound-----	0-6	23-53	27-50	15-25	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	6-18	20-85	0-53	10-27	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	18-24	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
Co1C2: Coyle-----	0-11	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	11-26	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	26-37	20-83	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32			
	37-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
Ironmound-----	0-5	23-53	27-50	15-25	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	5-17	20-85	0-53	10-27	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	17-24	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			

Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility index
										K	Kf	T	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct				
CoUB: Coyle-----	0-8	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	48
	8-14	23-80	0-50	18-26	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37		
	14-22	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	22-30	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
Urban land. CoUC: Coyle-----	0-8	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	48
	8-12	23-80	0-50	18-26	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37		
	12-22	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	22-29	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32		
	29-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
Urban land. CoyB: Coyle-----	0-6	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	48
	6-11	23-80	0-50	18-26	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37		
	11-18	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	18-25	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32		
	25-31	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32		
	31-42	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
CoyC2: Coyle-----	0-5	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	48
	5-10	23-80	0-50	18-26	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37		
	10-14	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	14-18	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	18-27	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32		
	27-37	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
CoZC3: Coyle-----	0-6	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	2	48
	6-18	20-80	0-53	20-35	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	18-31	20-80	0-53	18-35	1.40-1.70	0.6-2	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32		
	31-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
Zaneis-----	0-5	23-53	27-50	15-26	1.30-1.60	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	56
	5-15	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	15-35	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	35-47	20-80	0-53	18-30	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	47-60	---	---	---	---	0.0000-0.2	---	---	---	---	---		







Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
GohC: Goodnight-----	0-9	70-90	0-30	5-12	1.35-1.50	6-20	0.05-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	9-18	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	18-25	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	25-64	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	64-80	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
GohE: Goodnight-----	0-10	70-90	0-30	5-12	1.35-1.50	6-20	0.05-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	10-22	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	22-32	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	32-52	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	52-80	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
GooE: Goodnight-----	0-6	86-100	0-14	2-10	1.35-1.50	6-20	0.02-0.06	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	6-20	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	20-80	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
Good: Goodnight-----	0-8	86-100	0-14	2-10	1.35-1.50	6-20	0.02-0.06	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	8-23	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	23-45	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
	45-80	70-100	0-30	2-12	1.50-1.70	6-20	0.02-0.11	0.0-2.9	0.5-1.0	.15	.15			
GraC: Grainola-----	0-5	0-20	40-73	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	5-18	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	18-27	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	27-32	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	32-42	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
GraD2: Grainola-----	0-4	0-20	40-73	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	4-26	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	26-38	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	38-48	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
GrHC: Grant-----	0-7	0-50	50-88	15-26	1.30-1.50	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	7-11	0-85	0-88	15-26	1.30-1.55	0.6-2	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37			
	11-17	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	17-35	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	35-54	0-53	27-82	18-35	1.40-1.70	0.6-2	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	54-58	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---			

Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
									K	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Organic matter	Pct			
GrHC: Huska-----	0-6	15-50	50-88	12-26	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	1.0-3.0	.49	.49	2	56
	6-17	0-45	15-65	35-45	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	17-32	0-45	15-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	32-40	0-45	15-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	40-50	0-45	15-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	50-54	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
GrIE: Grainola-----	0-7	0-20	40-73	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	38
	7-12	0-45	0-60	35-60	1.30-1.70	0.06-0.2	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37		
	12-27	0-45	0-60	35-60	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37		
	27-38	0-45	0-60	35-60	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37		
	38-46	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
	0-7	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	2	86
Ironmound-----	7-18	20-85	0-53	10-27	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32		
	18-22	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
	0-8	20-45	15-53	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	38
	8-20	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37		
	20-27	0-45	0-60	35-60	1.30-1.70	0.0015-0.06	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37		
	27-30	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
Lucien-----	0-7	23-53	27-50	15-25	1.30-1.55	2-6	0.12-0.24	0.0-2.9	1.0-3.0	.32	.32	2	56
	7-12	23-85	0-50	10-25	1.30-1.55	2-6	0.12-0.24	0.0-2.9	0.5-2.0	.32	.32		
	12-15	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---		
	0-4	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	86
	4-22	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		
	22-42	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		
HaGD4: Harrah-----	42-54	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		
	54-72	43-85	0-50	18-35	1.40-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32		
	72-80	43-85	0-50	18-35	1.40-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32		
	0-7	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	86
	7-16	43-90	0-50	5-18	1.30-1.60	2-6	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20		
	16-39	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		
Gullied land. HarC: Harrah-----	39-64	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		
	64-72	43-85	0-50	18-35	1.40-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32		
	72-80	43-85	0-50	18-35	1.40-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32		
	0-7	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	86
	7-16	43-90	0-50	5-18	1.30-1.60	2-6	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20		
	16-39	43-85	0-50	18-35	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32		



Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Erosion factors			Wind erodi- bility index
									K	Kf	T	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Organic matter	Pct		
IroC2: Ironmound-----	0-7	23-53	27-50	15-25	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	56
	7-16	23-85	0-50	10-27	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32	
	16-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---	
KgFB: Kingfisher-----	0-10	0-50	50-88	15-27	1.30-1.55	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	56
	10-22	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32	
	22-32	0-45	15-73	27-42	1.45-1.70	0.2-0.6	0.14-0.22	3.0-5.9	0.0-0.5	.32	.32	
	32-38	0-45	15-73	27-42	1.45-1.70	0.2-0.6	0.14-0.22	3.0-5.9	0.0-0.5	.32	.32	
	38-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---	
KinC2: Kingfisher-----	0-8	23-53	27-80	15-27	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	56
	8-13	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32	
	13-20	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32	
	20-27	0-45	15-73	27-42	1.45-1.70	0.2-0.6	0.14-0.22	3.0-5.9	0.0-0.5	.32	.32	
	27-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---	
KonB: Konawa-----	0-7	70-90	0-30	2-10	1.45-1.65	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	134
	7-12	43-100	0-50	2-15	1.40-1.75	0.6-2	0.05-0.19	0.0-2.9	0.3-1.0	.32	.32	
	12-25	45-82	0-27	18-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	25-38	45-82	0-27	18-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	38-52	45-82	0-27	12-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	52-80	45-90	0-30	7-30	1.40-1.70	2-6	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20	
KonD2: Konawa-----	0-9	70-90	0-30	2-10	1.45-1.65	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	134
	9-23	52-80	0-27	18-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	23-38	52-80	0-27	18-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	38-49	52-80	0-27	18-30	1.45-1.70	0.6-6	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24	
	49-70	45-90	0-30	7-30	1.40-1.70	2-6	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20	
	70-80	45-90	0-30	7-30	1.40-1.70	2-6	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20	
KrdA: Kirkland-----	0-8	0-32	50-88	13-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	56
	8-19	0-45	0-60	40-60	1.35-1.60	0.0015-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37	
	19-41	0-45	0-60	40-60	1.35-1.60	0.0015-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37	
	41-59	0-45	0-60	40-60	1.35-1.60	0.0015-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37	
	59-85	0-45	0-60	35-60	1.30-1.65	0.0015-0.06	0.10-0.18	9.0-25.0	0.5-1.0	.32	.32	
	85-96	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---	





Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										K	Kf	T		
MinF: Minco-----	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
	0-9	43-85	0-50	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37	5	3	86
	9-19	0-85	0-88	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37			
	19-39	0-85	0-88	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37			
	39-64	0-85	0-88	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37			
	64-70	0-85	0-88	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37			
Mlla: Miller-----	70-80	0-85	0-88	8-18	1.35-1.60	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37			
	0-9	0-20	40-60	40-50	1.25-1.45	0.0015-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37	5	4	86
	9-15	0-45	0-60	35-60	1.35-1.65	0.0015-0.06	0.12-0.19	6.0-8.9	0.5-2.0	.37	.37			
	15-27	0-45	0-60	35-60	1.35-1.65	0.0015-0.06	0.12-0.19	6.0-8.9	0.5-2.0	.37	.37			
	27-41	0-45	0-60	35-60	1.35-1.65	0.06-0.2	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
MulC: Mulhall-----	41-55	0-45	0-60	35-60	1.35-1.65	0.06-0.2	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
	55-80	0-45	0-60	25-50	1.35-1.65	0.06-0.2	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
	0-11	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	11-17	20-53	5-53	18-30	1.45-1.70	0.6-2	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	17-32	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
MulC2: Mulhall-----	32-40	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
	40-70	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
	70-82	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
	0-10	23-53	27-50	15-26	1.30-1.55	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	10-22	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
NavA: Navina-----	22-36	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
	36-54	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
	54-80	30-80	0-35	20-35	1.45-1.70	0.6-2	0.10-0.20	0.0-2.9	0.0-0.5	.32	.32			
	80-90	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
	0-8	43-85	0-50	8-20	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	1.0-3.0	.24	.24	5	3	86
NavB: Navina-----	8-14	20-80	0-53	15-35	1.30-1.70	0.6-2	0.11-0.20	0.0-2.9	1.0-2.0	.37	.37			
	14-33	20-80	0-53	18-35	1.30-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	33-41	20-80	0-53	18-35	1.30-1.70	0.6-2	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	41-71	23-80	0-50	10-35	1.40-1.70	0.6-2	0.13-0.20	0.0-2.9	0.5-1.0	.24	.24			
	71-80	32-90	0-50	2-15	1.35-1.70	2-6	0.07-0.20	0.0-2.9	0.5-1.0	.24	.24			
NavB: Navina-----	0-7	43-85	0-50	8-20	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	7-16	15-80	0-53	15-35	1.30-1.70	0.6-2	0.11-0.20	0.0-2.9	1.0-3.0	.37	.37			
	16-37	20-80	0-53	18-35	1.30-1.70	0.6-2	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	37-60	20-80	0-53	15-35	1.30-1.70	0.6-2	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	60-71	23-80	0-50	10-35	1.40-1.70	0.6-2	0.13-0.20	0.0-2.9	0.5-1.0	.24	.24			
	71-80	32-90	0-50	2-15	1.35-1.70	2-6	0.07-0.20	0.0-2.9	0.5-1.0	.24	.24			



Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Erosion factors				Wind erodi- bility index
									K	Kf	T	group	
NeGD4: Newalla-----	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct					
	0-6	43-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	.37	.37	4	3	86
	6-11	20-80	0-53	20-35	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	.43	.43			
	11-28	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	.37	.37			
	28-46	0-65	0-60	40-60	1.30-1.65	0.0015-0.06	0.04-0.18	6.0-8.9	.37	.37			
	46-60	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---			
Gullied land.													
NewB: Newalla-----	0-6	43-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	.37	.37	4	3	86
	6-12	43-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	.37	.37			
	12-19	20-80	0-53	20-35	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	.43	.43			
	19-41	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	.37	.37			
	41-46	0-65	0-60	40-60	1.30-1.65	0.0015-0.06	0.04-0.18	6.0-8.9	.37	.37			
	46-52	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---			
NorA: Norge-----	0-11	0-50	50-88	15-26	1.30-1.50	0.6-2	0.15-0.24	0.0-2.9	.37	.37	5	6	48
	11-16	0-50	50-88	15-26	1.30-1.50	0.6-2	0.15-0.24	0.0-2.9	.37	.37			
	16-23	0-45	15-82	18-35	1.40-1.70	0.2-2	0.15-0.24	3.0-5.9	.32	.32			
	23-43	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	43-61	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	61-80	0-45	15-73	27-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
NorB: Norge-----	0-12	0-50	50-88	15-26	1.30-1.50	0.6-2	0.15-0.24	0.0-2.9	.37	.37	5	6	48
	12-18	0-45	15-82	18-35	1.40-1.70	0.2-2	0.15-0.24	3.0-5.9	.32	.32			
	18-24	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	24-45	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	45-62	0-45	15-73	27-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	62-80	0-45	15-73	27-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
NorC2: Norge-----	0-8	0-50	50-88	15-26	1.30-1.50	0.6-2	0.15-0.24	0.0-2.9	.37	.37	5	6	48
	8-15	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	15-33	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	33-43	0-45	15-73	27-35	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	43-65	0-45	15-73	27-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			
	65-80	0-45	15-73	27-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	.32	.32			

Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind index
										K	Kf	T		
OWHD: Oil waste land.														
Huska-----	0-8	0-50	50-88	12-26	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	1.0-3.0	.49		2	5	56
	8-19	0-45	0-65	35-45	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43				
	19-40	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43				
	40-51	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43				
	51-59	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43				
	59-80	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---				
PieB: Piedmont-----	0-8	0-20	40-73	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43		3	6	48
	8-17	0-45	0-65	35-55	1.35-1.70	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	17-27	0-45	0-65	35-55	1.35-1.70	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	27-32	0-45	0-65	35-55	1.35-1.70	0.0015-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37				
	32-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---				
PieC2: Piedmont-----	0-7	0-20	40-73	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43		3	6	48
	7-14	0-45	0-65	35-55	1.35-1.70	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	14-27	0-45	0-65	35-55	1.35-1.70	0.0015-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37				
	27-40	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---				
PIT. Pits														
Puka: Pulaski-----	0-8	43-85	0-50	10-18	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.20		5	3	86
	8-28	32-85	0-50	10-18	1.30-1.70	2-6	0.13-0.19	0.0-2.9	0.0-1.0	.32				
	28-80	32-90	0-50	5-18	1.30-1.70	2-6	0.07-0.20	0.0-2.9	0.0-1.0	.32				
Pula: Pulaski-----	0-10	43-85	0-50	10-18	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.20		5	3	86
	10-14	43-85	0-50	10-18	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.20				
	14-36	32-85	0-50	10-18	1.30-1.70	2-6	0.13-0.19	0.0-2.9	0.0-1.0	.32				
	36-80	32-90	0-50	5-18	1.30-1.70	2-6	0.07-0.20	0.0-2.9	0.0-1.0	.32				
RenB: Renfrow-----	0-11	0-32	50-82	18-26	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.49		5	6	48
	11-19	0-45	15-82	22-40	1.30-1.75	0.2-0.6	0.15-0.24	3.0-5.9	0.5-2.0	.43				
	19-33	0-45	0-65	35-55	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	33-66	0-45	0-65	35-55	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	66-72	0-45	0-65	35-55	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43				
	72-80	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---				



Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										K	Kf	T		
	<u>In</u>	<u>Pct</u>	<u>Pct</u>	<u>Pct</u>	<u>g/cc</u>	<u>In/hr</u>	<u>In/in</u>	<u>Pct</u>	<u>Pct</u>					
SDND: Stephenville---	0-7	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3		86
	7-13	43-90	0-50	5-15	1.40-1.70	2-20	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	13-28	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	28-36	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---			
Darsil-----	0-5	43-85	0-50	1-10	1.45-1.65	6-20	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2		86
	5-18	70-100	0-30	1-10	1.50-1.75	6-20	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17	3		
	18-20	---	---	---	1.85-2.00	0.2-2	---	---	---	---	---			
Newalla-----	0-4	3-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4		86
	4-8	43-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.37	.37			
	8-13	20-80	0-53	20-35	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	13-27	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
SDND2: Stephenville---	27-48	0-65	0-60	40-60	1.30-1.65	0.0015-0.06	0.04-0.18	6.0-8.9	0.0-0.5	.37	.37			
	48-80	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---			
Darsil-----	0-6	43-85	0-50	1-10	1.45-1.65	6-20	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2		86
	6-11	70-100	0-30	1-10	1.50-1.75	6-20	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17	3		
	11-24	---	---	---	1.85-2.00	0.2-2	---	---	---	---	---			
Newalla-----	0-5	43-85	0-50	7-17	1.40-1.65	0.6-2	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4		86
	5-12	20-80	0-53	20-35	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	12-26	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	26-40	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
Slab: Slaughterville-	40-80	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---			
	0-11	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	5		86
	11-20	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20			
	20-34	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20			
	34-42	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20			
	42-53	43-90	0-50	3-18	1.50-1.70	2-20	0.07-0.15	0.0-2.9	0.0-1.0	.20	.20			
	53-80	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.0-1.0	.20	.20			

Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility index
										K	Kf	T	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct				
Slad: Slaughterville-	0-8	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	5	86
	8-16	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20		
	16-34	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20		
	34-50	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20		
	50-80	43-90	0-50	3-18	1.50-1.70	2-20	0.07-0.15	0.0-2.9	0.0-1.0	.20	.20		
Slaf: Slaughterville-	0-8	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	5	86
	8-16	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20		
	16-34	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.0-1.0	.20	.20		
	34-48	43-85	0-50	10-18	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.0-1.0	.20	.20		
	48-63	43-90	0-50	3-18	1.50-1.70	2-20	0.07-0.15	0.0-2.9	0.0-1.0	.20	.20		
StDC: Stephenville---	0-6	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	86
	6-14	43-90	0-50	5-15	1.40-1.70	2-20	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20		
	14-23	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	23-30	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	30-40	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---		
Darsil-----	0-4	43-85	0-50	1-10	1.45-1.65	6-20	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	86
	4-15	70-100	0-30	1-10	1.50-1.75	6-20	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17		
	15-20	---	---	---	1.85-2.00	0.2-2	---	---	---	---	---		
StDC2: Stephenville---	0-8	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	86
	8-21	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	21-32	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	32-38	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	38-44	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---		
Darsil-----	0-8	43-85	0-50	1-10	1.45-1.65	6-20	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	86
	8-16	0-100	0-30	1-10	1.50-1.75	6-20	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17		
	16-30	---	---	---	1.85-2.00	0.2-2	---	---	---	---	---		
StDE: Stephenville---	0-7	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	86
	7-14	43-90	0-30	5-15	1.40-1.70	2-20	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20		
	14-27	43-85	0-50	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32		
	27-40	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---		
Darsil-----	0-7	70-90	0-30	1-10	1.45-1.65	6-20	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	134
	7-16	70-100	0-30	1-10	1.50-1.75	6-20	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17		
	16-20	---	---	---	1.85-2.00	0.2-2	---	---	---	---	---		

Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
SteB:														
Stephenville---	0-6	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	6-12	43-90	0-30	5-15	1.40-1.70	2-20	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	12-22	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	22-35	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	35-40	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---			
SteC2:														
Stephenville---	0-8	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	8-29	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	29-40	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---			
SUND:														
Stephenville---	0-9	43-85	0-50	10-20	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	9-28	45-80	0-27	18-35	1.35-1.75	0.6-2	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	28-40	---	---	---	1.85-2.00	0.2-0.6	---	---	---	---	---			
Urban land.														
Newalla-----	0-6	23-53	27-50	10-25	1.30-1.55	0.6-2	0.14-0.20	0.0-2.9	0.5-3.0	.49	.49	4	3	86
	6-11	20-80	0-53	20-35	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	11-34	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	34-58	0-45	0-60	40-60	1.30-1.60	0.0015-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	58-72	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---			
TelB:														
Teller-----	0-9	23-53	27-50	10-20	1.30-1.70	2-6	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	9-15	23-85	0-50	10-20	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	15-31	20-80	0-53	20-30	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	31-44	20-80	0-53	20-30	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	44-55	43-85	0-50	10-20	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	55-80	43-85	0-50	10-20	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
TelC2:														
Teller-----	0-4	23-53	0-50	10-20	1.30-1.70	2-6	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	4-25	23-85	0-50	10-20	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	25-44	20-80	0-53	20-30	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	44-59	20-80	0-53	20-30	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	59-80	20-80	0-53	20-30	1.30-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
TriA:														
Tribbey-----	0-6	43-85	0-50	10-18	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	6-45	32-85	0-50	10-18	1.65-1.75	2-6	0.07-0.20	0.0-2.9	0.0-0.5	.24	.24			
	45-80	32-90	0-50	5-18	1.35-1.75	2-6	0.07-0.20	0.0-2.9	0.0-0.5	.24	.24			

Physical Properties of the Soils-Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility index
										K	Kf	T	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct				
URB. Urban land													
W. Water													
YaaA: Yahola-----	0-7	32-52	27-80	10-18	1.30-1.55	2-6	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32	5	56
	7-14	32-85	0-50	5-18	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32		
	14-34	32-85	0-50	5-18	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32		
	34-46	32-90	0-50	5-18	1.30-1.70	2-6	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32		
	46-80	32-90	0-50	5-18	1.30-1.70	2-6	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32		
YaaA: Yahola-----	0-6	43-85	0-50	10-18	1.40-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	86
	6-34	32-85	0-50	5-18	1.30-1.70	2-6	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32		
	34-80	32-90	0-50	5-18	1.30-1.70	2-6	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32		
ZaHC: Zaneis-----	0-12	43-85	0-50	10-18	1.40-1.65	2-6	0.10-0.15	0.0-2.9	1.0-3.0	.20	.20	4	86
	12-25	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	25-32	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	32-52	20-80	0-53	18-30	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	52-60	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
Huska-----	0-5	23-53	27-50	12-26	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	1.0-3.0	.49	.49	2	56
	5-13	0-45	0-65	35-45	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	13-20	0-45	0-65	35-45	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	20-39	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
	39-59	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43		
ZanB: Zaneis-----	59-67	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
	0-10	23-53	27-50	15-26	1.30-1.60	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	56
	10-17	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	17-28	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	28-38	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	38-44	20-80	0-53	18-30	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	44-54	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		

Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group index
										K	Kf	T	
ZanC: Zaneis-----	<u>In</u>	<u>Pct</u>	<u>Pct</u>	<u>Pct</u>	<u>g/cc</u>	<u>In/hr</u>	<u>In/in</u>	<u>Pct</u>	<u>Pct</u>				
	0-8	22-53	27-50	15-26	1.30-1.60	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	56
	8-14	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	14-25	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	25-31	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	31-47	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	47-54	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		
ZanC2: Zaneis-----	0-8	23-53	27-50	15-26	1.30-1.60	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	56
	8-15	20-80	0-53	18-30	1.40-1.70	0.6-2	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37		
	15-26	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	26-43	20-80	0-53	20-38	1.45-1.70	0.2-0.6	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32		
	43-56	20-80	0-53	18-30	1.40-1.70	0.6-2	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32		
	56-60	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---		



## Physical Analyses of Selected Soils

The results of physical analyses of several pedons are given in the table "Physical Properties of Selected Soils." The data are for soils sampled at carefully selected sites. The pedons are representative of the series described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

Most determinations, except for those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (8).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a),  $\frac{1}{3}$  bar (4A1d), oven-dry (4A1h).

Water-retention difference—between  $\frac{1}{3}$  bar and 15 bars for whole soil (4C1).

Water retained—pressure extraction, percentage of oven-dry weight of less than 2 mm material;  $\frac{1}{3}$  or  $\frac{1}{10}$  bar (4B1), 15 bars (4B2).

Linear extensibility—change in clod dimension based on whole soil (4D).





Physical Properties of Selected Soils—Continued

Soil name and sample number	HO	Depth	Particle-size distribution													Bulk density	Water retention difference 1/3 bar 15 bar	Water content									
			Clay			Silt		Sand							Oven-dry 1/3 bar			Pct	Pct								
			less than 0.002 mm	Total silt 0.002-0.05 mm	Fine (0.002-0.02 mm)	Coarse (0.02-0.05 mm)	Total sand 0.05-2.0 mm	Very fine (0.05-0.10 mm)	Fine (0.10-0.25 mm)	Medium (0.25-0.50 mm)	Coarse (0.5-1 mm)	Very coarse (2.0-1.0 mm)															
													Percent														
													-----														
In			-----										---g/cm3---		Cm/cm		Pct	Pct									
Masham: (S91OK-083-008)	A	0-4	37.0	43.4	25.0	18.4	19.6	13.4	4.1	0.9	0.8	0.4	1.34	1.50	0.07	19.2	13.6	0.036									
	Bw	4-8	34.8	46.2	29.3	16.9	19.0	13.7	3.3	0.9	0.8	0.3	1.60	1.79	0.11	17.8	11.0	0.038									
	BC	8-13	35.9	42.5	28.2	14.3	21.6	14.9	4.9	0.7	0.7	0.4	1.71	1.90	0.07	16.0	11.8	0.036									
	Cr1	13-25	33.8	41.3	26.9	14.4	24.9	17.7	6.2	0.5	0.4	0.1	1.85	2.02	0.04	13.9	11.6	0.030									
	Cr2	25-39	35.8	38.8	25.8	13.1	25.4	15.4	5.4	1.4	2.3	0.9	1.93	2.10	0.02	13.7	12.5	0.029									
	2Cr3	39-47	32.2	37.9	23.6	14.3	29.9	22.3	7.3	0.1	0.1	0.1	1.90	2.12	0.07	14.1	10.6	0.037									
Mulhall: (S91OK-083-002)	Ap	0-3	16.4	42.3	12.7	29.6	41.3	25.0	15.7	0.4	0.1	0.1	---	---	---	---	8.4	---									
	Ad	3-7	22.9	40.3	13.3	27.0	36.8	22.5	13.8	0.4	0.1	TR	---	---	---	---	9.9	---									
	Bd	7-11	34.5	34.5	17.2	17.3	31.0	22.4	7.8	0.4	0.3	0.1	---	---	---	---	13.7	---									
	Bt1	11-19	31.7	39.3	17.5	21.8	29.0	17.5	10.9	0.4	0.1	0.1	---	---	---	---	13.2	---									
	Bt2	19-23	29.9	28.6	12.6	16.0	41.5	22.9	17.9	0.4	0.2	0.1	---	---	---	---	11.9	---									
	2Bt3	23-40	26.5	21.1	8.2	12.9	52.4	26.7	25.2	0.3	0.1	0.1	---	---	---	---	10.5	---									
	2Bt4	40-54	25.3	17.9	7.4	10.5	56.8	32.8	23.4	0.3	0.2	0.1	---	---	---	---	10.2	---									
	2BC	54-68	27.5	16.8	5.4	11.4	55.7	30.1	25.2	0.2	0.1	0.1	---	---	---	---	11.0	---									
	3Bt1	68-76	20.4	22.1	8.1	14.0	57.5	32.3	23.2	1.2	0.7	0.1	---	---	---	---	8.6	---									
	3BC	76-81	16.8	17.4	10.3	7.1	65.8	13.9	46.5	3.1	1.5	0.8	---	---	---	---	6.9	---									
Mulhall: (S91OK-083-006)	3Cr	81-90	7.6	15.6	8.6	7.0	76.8	39.5	34.8	1.4	0.9	0.2	---	---	---	---	3.9	---									
	Ap	0-6	16.6	33.9	12.0	21.9	49.5	28.7	20.4	0.2	0.1	0.1	1.35	1.42	0.16	20.9	9.3	0.017									
	A1	6-11	18.0	31.0	11.2	19.8	51.0	32.2	18.4	0.3	0.1	TR	1.38	1.48	0.21	22.5	7.3	0.024									
	BAt	11-17	20.8	31.0	10.1	20.9	48.2	28.4	19.5	0.2	0.1	TR	1.37	1.49	0.22	23.8	8.1	0.028									
	Bt1	17-26	27.0	27.3	10.5	16.8	45.7	24.9	20.3	0.2	0.2	0.1	1.42	1.60	0.17	22.4	10.5	0.041									
	Bt2	26-31	28.2	21.4	9.2	12.2	50.4	25.0	25.1	0.1	0.1	0.1	1.49	1.67	0.16	21.8	10.9	0.039									
	Bt3	31-40	27.8	16.6	7.3	9.3	55.6	30.5	25.0	0.1	TR	---	1.59	1.76	0.13	19.7	11.3	0.034									
	2Bt4	40-51	27.3	15.0	6.2	8.8	57.7	30.1	27.2	0.2	0.1	0.1	1.66	1.78	0.11	17.9	11.1	0.024									
	2Bt5	51-65	25.9	15.4	6.0	9.4	58.7	29.5	28.9	0.1	0.1	0.1	1.66	1.77	0.12	17.6	10.6	0.022									
	2BC	65-70	22.1	16.1	5.8	10.3	61.8	40.0	21.4	0.2	0.1	0.1	1.72	1.82	0.13	17.1	9.4	0.019									
Piedmont: (S88OK-083-001)	2Cr	70-84	17.0	13.0	6.3	6.7	70.0	48.2	20.4	1.0	0.3	0.1	1.84	1.85	0.04	9.9	7.5	0.002									
	A	0-8	37.1	47.1	18.1	29.0	15.8	9.0	5.0	1.8	---	---	---	---	---	---	15.0	---									
	Bt1	8-17	45.4	42.6	19.4	23.2	12.0	5.3	4.6	2.1	---	---	---	---	---	---	17.1	---									
	Bt2	17-27	45.9	42.7	21.6	21.1	11.4	5.7	4.0	1.7	---	---	---	---	---	---	16.8	---									
Piedmont: (S88OK-083-002)	BC	27-32	33.2	59.9	34.3	25.6	6.9	3.1	1.8	1.1	0.5	0.4	---	---	---	---	13.9	---									
	A1	0-9	38.3	53.9	19.7	34.2	7.8	6.3	1.3	0.2	---	---	---	---	---	---	15.1	---									
	Bt1	9-14	57.9	37.7	17.0	20.7	4.4	3.5	0.7	0.2	---	---	---	---	---	---	19.3	---									
	Bt2	14-21	61.4	32.0	19.3	12.7	6.6	4.6	1.6	0.3	0.1	---	---	---	---	---	22.2	---									
	BC	21-27	43.2	39.1	25.3	13.8	17.6	9.4	4.6	1.4	1.1	1.2	---	---	---	---	19.8	---									

Physical Properties of Selected Soils-Continued

Soil name and sample number	HO	Depth less than 0.002 mm	Particle-size distribution										Bulk density		Water retention difference 1/3 bar 15 bar	Water content	COLE	
			Clay	Silt		Sand						Oven-dry 1/3 bar	Pct					
				Total silt (0.002-0.05 mm)	Fine (0.002-0.02 mm)	Coarse (0.02-0.05 mm)	Total sand (0.05-2.0 mm)	Very fine (0.05-0.10 mm)	Fine (0.10-0.25 mm)	Medium (0.25-0.50 mm)	Coarse (0.5-1 mm)			Very coarse (2.0-1.0 mm)				---g/cm3---
In			-----Percent-----										-----g/cm3-----		Cm/cm	Pct	Pct	
Stephenville: (S89OK-083-003)	A	0-5	8.2	18.9	6.2	12.7	72.9	32.7	38.1	1.5	0.3	0.3	---	---	---	---	3.8	---
	E	5-8	10.9	13.6	4.5	9.1	75.5	39.1	33.5	1.4	0.5	1.0	---	---	---	---	3.4	---
	Bt1	8-18	29.3	7.3	4.1	3.2	63.4	37.2	25.4	0.5	0.2	0.1	---	---	---	---	9.8	---
	Bt2	18-25	18.5	9.2	4.5	4.7	72.1	45.0	26.8	0.3	---	---	---	---	---	---	6.4	---
Zaneis: (S90OK-083-001)	A	0-10	14.6	42.2	15.7	26.5	43.2	23.4	19.3	0.4	0.1	TR	---	---	---	---	7.3	---
	BA	10-17	20.2	39.5	15.6	23.9	40.3	21.9	17.9	0.4	0.1	TR	---	---	---	---	9.2	---
	Bt1	17-28	28.9	33.9	17.6	16.3	37.2	18.5	17.8	0.5	0.3	0.1	---	---	---	---	12.2	---
	Bt2	28-38	34.0	25.9	14.3	11.6	40.1	20.3	19.2	0.3	0.2	0.1	---	---	---	---	12.8	---
Zaneis: (S90OK-083-003)	Bct	38-44	27.0	18.1	8.5	9.6	54.9	35.7	19.1	0.1	TR	---	---	---	---	---	10.8	---
	Ap	0-4	11.5	24.3	9.1	15.2	64.2	20.6	43.0	0.5	0.1	TR	1.23	1.33	0.19	22.2	6.8	0.026
	Ad	4-6	14.1	25.9	9.6	16.3	60.0	19.1	40.4	0.4	0.1	TR	1.40	1.48	0.20	20.8	6.4	0.019
	BA	6-11	16.4	25.8	9.6	16.2	57.8	17.5	39.8	0.4	0.1	TR	1.44	1.54	0.19	20.4	7.1	0.023
	Bt1	11-18	21.9	22.6	9.1	13.5	55.5	18.9	35.9	0.4	0.2	0.1	1.47	1.64	0.17	20.6	9.2	0.037
	Bt2	18-25	25.5	19.4	8.0	11.4	55.1	19.8	34.7	0.4	0.1	0.1	1.51	1.66	0.14	19.6	10.4	0.032
	Bt3	25-35	18.7	11.5	3.9	7.6	69.8	22.7	46.6	0.2	0.1	0.2	1.54	1.63	0.11	14.9	7.7	0.019
	BC	35-43	15.6	7.7	3.0	4.7	76.7	19.9	56.7	0.1	TR	TR	1.60	1.67	0.08	11.0	6.2	0.014
	Cr	43-54	17.2	6.1	1.3	4.8	76.7	36.5	40.2	TR	TR	---	---	---	---	---	7.2	---
	R	54-67	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4.1	---

Location of sampled pedons:

R. 4 W. Bathel loamy fine sand (S92OK-083-006); about 1,800 feet east and 2,000 feet south of the northwest corner sec. 7, T. 17 N., R. 4 W.

Bethany silt loam (S89OK-083-001); about 2,375 feet west and 1,150 feet south of the northeast corner sec. 23, T. 19 N., R. 2 W. (Inclusion of similar soil in map unit Beta; exchangeable sodium percentage and sodium adsorption ratio are higher than the normal range for the Bethany series.)

Coyle loam (S92OK-083-001); about 1,450 feet east and 1,600 north of the southwest corner of sec. 34, T. 17 N., R. 2 W. (Lab data reflect that the surface layer is slightly outside the normal loam texture, but the data is within the normal range for laboratory error.)

Darsil loamy fine sand (S91OK-083-007); about 650 feet east and 300 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W. (The pH of the A and EC horizons is slightly too low for the series.)

Ironmound very fine sandy loam (S92OK-083-005); about 700 feet west and 1,050 feet north of the southeast corner of sec. 30, T. 19 N., R. 4 W.

Kingfisher loam (S90OK-083-004); about 1,500 feet west and 100 north of the southeast corner of sec. 36, T. 20 N., R. 2 W. (Inclusion to the map unit CoIC2; mineralogy is siliceous and is outside the range of the series.)

## Physical Properties of Selected Soils--Continued

## Location of sampled pedons:

Kingfisher loam (S900K-083-005); about 450 feet south and 100 east of the northwest corner of sec. 5, T. 19 N., R. 2 W. (The pH of the surface layer is slightly high for the series due to the addition of acid-forming fertilizer.)

Kirkland silt loam (S890K-083-002); about 2,350 feet south and 2,450 feet east of the northwest corner sec. 16, T. 19 N., R. 4 W. (Inclusion of similar soil in map unit KirB; exchangeable sodium percentage and sodium adsorption ratio are higher than the normal range for the series.)

Kirkland silt loam (S910K-083-005); about 1,000 feet north and 150 feet west of the southeast corner of sec. 36, T. 16 N., R. 4 W. (The reaction is slightly outside of the range of the series because of the addition of acid-forming fertilizer.)

Lawrie loam (S910K-083-004); about 1,800 feet east and 700 feet south of the northeast corner of sec. 27, T. 17 N., R. 1 W.

Lebron clay (S920K-083-004); about 3,800 feet east and 1,200 feet south of the northwest corner of sec. 9, T. 17 N., R. 2 W. (This is the type location for the series.)

Masham silty clay loam (S910K-083-008); about 1,200 feet east and 300 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W.

Mulhall loam (S910K-083-002); about 1,000 feet west and 100 feet north of the southeast corner of sec. 18, R. 18 W., T. 2 W.

Mulhall loam (S910K-083-006); about 1,250 feet east and 800 feet south of the northwest corner of sec. 19, R. 19 N., T. 2 W.

Piedmont silty clay loam (S880K-083-001); about 200 feet east and 150 feet south of the northwest corner of sec. 18, T. 18 N., R. 4 W.

Piedmont silty clay loam (S880K-083-002); about 1,800 feet east and 100 feet south of the northwest corner of sec. 18, T. 18 N., R. 4 W. (The clay content is higher than is allowed by the series.)

Stephenville fine sandy loam (S890K-083-003); about 600 feet west and 950 feet north of the southeast corner of sec. 12, T. 15 N., R. 2 W. (The base saturation of the lower part of the argillic horizon is 76, which is outside the range of the series, and the pH is slightly higher than is allowed by the series. These data, however, are within the normal range for laboratory error.)

Zaneis loam (S900K-083-001); about 100 feet east and 100 feet south of the northwest corner of sec. 35, T. 19 N., R. 2 W.

Zaneis fine sandy loam (S910K-083-003); about 5,000 feet west and 2,500 feet north of the southeast corner of sec. 30, T. 18 N., R. 2 W. (The surface layer of fine sandy loam is not typical for the map unit ZanB but is within the range of the Zaneis series. This pedon is an inclusion to the map unit ZanB.)

## Chemical Properties

The table “Chemical Properties of the Soils” shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the section “Soil Series and Their Morphology.”

*Cation-exchange capacity* is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

*Soil reaction* is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Calcium carbonate equivalent* is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

*Gypsum* is given as the percent, by weight, of hydrated calcium sulfates in the soil. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum (more than 10 percent) may collapse if the gypsum is removed by percolating water.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter (decisiemens per meter) at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*Sodium adsorption ratio* is the measure of sodium relative to calcium and magnesium in the water extract from saturated soil paste. Soils having a sodium adsorption ratio of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

## Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
<b>AspA:</b>							
Ashport-----	0-10	9.0-16	5.6-8.4	0	0	0	0
	10-22	11-21	6.1-8.4	0-1	0	0	0
	22-44	11-21	6.1-8.4	0-1	0	0	0
	44-80	11-21	7.3-8.4	0-1	0	0	0
<b>AstA:</b>							
Ashport-----	0-11	9.0-16	5.6-8.4	0	0	0	0
	11-30	11-21	6.1-8.4	0-1	0	0	0
	30-36	11-21	6.1-8.4	0-1	0	0	0
	36-52	11-21	6.1-8.4	0-1	0	0	0
	52-67	11-21	7.3-8.4	0-1	0	0	0
	67-80	11-21	7.3-8.4	0-1	0	0	0
<b>BetA:</b>							
Bethany-----	0-8	10-16	5.1-7.8	0	0	0	0
	8-18	17-21	6.1-7.8	0	0	0	0
	18-28	17-21	6.1-7.8	0	0	0	0
	28-46	21-30	6.6-8.4	0-2	0	0	0
	46-62	21-30	6.6-8.4	0-2	0	0	0
	62-80	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
<b>BetB:</b>							
Bethany-----	0-10	10-16	5.1-7.8	0	0	0	0
	10-22	17-21	6.1-7.8	0	0	0	0
	22-31	21-30	6.6-8.4	0	0	0	0
	31-51	21-30	6.6-8.4	0-2	0	0	0
	51-74	21-30	6.6-8.4	0-2	0	0	0
	74-80	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
<b>BocA:</b>							
Bocox-----	0-11	2.0-7.0	6.6-7.8	0	0	0.0-2.0	0
	11-20	2.0-7.0	6.6-7.8	0	0	0.0-2.0	0
	20-33	2.0-7.0	6.6-7.8	0	0	0.0-2.0	0
	33-52	11-21	6.6-7.8	0	0	0.0-2.0	0
	52-65	11-21	6.6-7.8	0	0	0.0-2.0	0
	65-80	11-21	6.6-7.8	0	0	0.0-2.0	0
<b>Bt1A:</b>							
Bathel-----	0-12	2.0-7.0	5.6-7.3	0	0	0.0-2.0	0
	12-18	2.0-11	5.1-7.3	0	0	0.0-2.0	0
	18-22	12-21	6.6-8.4	0-2	0	0.0-2.0	0
	22-45	11-27	7.4-8.4	0-2	0	0.0-2.0	0
	45-80	2.0-11	7.4-8.4	0-2	0	0.0-2.0	0
<b>CaaA:</b>							
Canadian-----	0-10	3.0-11	5.6-7.8	0	0	0	0
	10-19	3.0-11	5.6-7.8	0	0	0	0
	19-31	6.0-11	6.1-8.4	0	0	0	0
	31-41	6.0-11	6.1-8.4	0	0	0	0
	41-55	3.0-11	6.1-8.4	0	0	0	0
	55-80	3.0-11	6.1-8.4	0	0	0	0



## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
CAID:							
Coyle-----	0-10	10-16	5.6-7.8	0	0	0	0
	10-19	13-21	5.6-7.8	0	0	0	0
	19-36	11-21	5.6-7.8	0	0	0	0
	36-40	---	---	---	---	---	---
Ashport-----	0-11	9.0-16	5.6-8.4	0	0	0	0
	11-26	11-21	6.1-8.4	0-1	0	0	0
	26-46	11-21	6.1-8.4	0-1	0	0	0
	46-63	11-21	7.3-8.4	0-1	0	0	0
	63-80	11-21	7.3-8.4	0-1	0	0	0
Ironmound-----	0-6	10-15	5.6-8.4	0	0	0	0
	6-18	10-21	6.1-8.4	0	0	0	0
	18-24	---	---	---	---	---	---
CoIC2:							
Coyle-----	0-11	10-16	5.6-7.8	0	0	0	0
	11-26	13-21	5.6-7.8	0	0	0	0
	26-37	11-21	5.6-7.8	0	0	0	0
	37-40	---	---	---	---	---	---
Ironmound-----	0-5	10-15	5.6-8.4	0	0	0	0
	5-17	10-21	6.1-8.4	0	0	0	0
	17-24	---	---	---	---	---	---
CoUB:							
Coyle-----	0-8	10-16	5.6-7.8	0	0	0	0
	8-14	11-16	5.6-7.8	0	0	0	0
	14-22	13-21	5.6-7.8	0	0	0	0
	22-30	---	---	---	---	---	---
Urban land.							
CoUC:							
Coyle-----	0-8	10-16	5.6-7.8	0	0	0	0
	8-12	11-16	5.6-7.8	0	0	0	0
	12-22	13-21	5.6-7.8	0	0	0	0
	22-29	11-21	5.6-7.8	0	0	0	0
	29-40	---	---	---	---	---	---
Urban land.							
CoyB:							
Coyle-----	0-6	10-16	5.6-7.8	0	0	0	0
	6-11	11-16	5.6-7.8	0	0	0	0
	11-18	13-21	5.6-7.8	0	0	0	0
	18-25	11-21	5.6-7.8	0	0	0	0
	25-31	11-21	5.6-7.8	0	0	0	0
	31-42	---	---	---	---	---	---
CoyC2:							
Coyle-----	0-5	10-16	5.6-7.8	0	0	0	0
	5-10	11-16	5.6-7.8	0	0	0	0
	10-14	13-21	5.6-7.8	0	0	0	0
	14-18	13-21	5.6-7.8	0	0	0	0
	18-27	11-21	5.6-7.8	0	0	0	0
	27-37	---	---	---	---	---	---

## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	<u>In</u>	<u>meq/100 g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
CoZC3:							
Coyle-----	0-6	10-16	5.6-7.8	0	0	0	0
	6-18	13-21	5.6-7.8	0	0	0	0
	18-31	11-21	5.6-7.8	0	0	0	0
	31-40	---	---	---	---	---	---
Zaneis-----	0-5	10-16	5.6-7.3	0	0	0	0
	5-15	11-18	5.6-7.3	0	0	0	0
	15-35	13-23	5.6-7.3	0	0	0	0
	35-47	11-18	6.1-7.8	0	0	0	0
	47-60	---	---	---	---	---	---
DAM. Dam							
DerB:							
Derby-----	0-11	2.0-6.0	5.6-7.8	0	0	0	0
	11-30	2.0-6.0	5.6-7.8	0	0	0	0
	30-52	1.0-7.0	5.6-7.8	0	0	0	0
	52-84	1.0-7.0	5.6-8.4	0	0	0	0
DerD:							
Derby-----	0-9	2.0-6.0	5.6-7.8	0	0	0	0
	9-23	1.0-7.0	5.6-7.8	0	0	0	0
	23-49	1.0-7.0	5.6-7.8	0	0	0	0
	49-80	1.0-7.0	5.6-8.4	0	0	0	0
DerE:							
Derby-----	0-11	2.0-6.0	5.6-7.8	0	0	0	0
	11-20	1.0-7.0	5.6-7.8	0	0	0	0
	20-38	1.0-7.0	5.6-7.8	0	0	0	0
	38-54	1.0-7.0	5.6-7.8	0	0	0	0
	54-80	1.0-7.0	5.6-8.4	0	0	0	0
DiRG:							
Darsil-----	0-4	1.0-6.0	5.1-7.8	0	0	0	0
	4-16	1.0-6.0	5.1-7.8	0	0	0	0
	16-24	---	---	---	---	---	---
Rock outcrop.							
DouB:							
Dougherty-----	0-13	2.0-7.0	5.1-6.5	0	0	0	0
	13-26	2.0-7.0	5.1-6.5	0	0	0	0
	26-43	11-18	5.1-6.5	0	0	0	0
	43-52	11-18	5.1-6.5	0	0	0	0
	52-64	8.0-15	5.1-6.5	0	0	0	0
	64-80	2.0-10	5.1-7.3	0	0	0	0
DouD:							
Dougherty-----	0-9	2.0-7.0	5.1-6.5	0	0	0	0
	9-22	2.0-7.0	5.1-6.5	0	0	0	0
	22-32	11-18	5.1-6.5	0	0	0	0
	32-44	8.0-15	5.1-6.5	0	0	0	0
	44-80	2.0-10	5.1-7.3	0	0	0	0
DUM. Dumps							

## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
EasA:							
Easpur-----	0-12	8.0-16	5.6-8.4	0	0	0	0
	12-18	8.0-16	5.6-8.4	0	0	0	0
	18-36	11-21	6.1-8.4	0	0	0	0
	36-62	11-21	6.1-8.4	0	0	0	0
	62-80	11-21	6.1-8.4	0-2	0	0	0
GadA:							
Gaddy-----	0-12	4.0-10	7.4-8.4	0-2	0	0	0
	12-29	4.0-10	7.9-8.4	1-5	0	0	0
	29-80	4.0-10	7.9-8.4	1-5	0	0	0
GaGA:							
Gaddy-----	0-6	7.0-12	7.4-8.4	0-2	0	0	0
	6-80	4.0-10	7.9-8.4	1-5	0	0	0
Gracemore-----	0-12	10-17	7.4-8.4	0-1	0	0.0-4.0	0
	12-80	2.0-7.0	7.9-8.4	0-1	0	0.0-4.0	0
GMGE4:							
Grainola-----	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-15	21-36	7.9-8.4	0-5	0	0	0
	15-31	21-36	7.9-8.4	0-10	0	0	0
	31-38	21-36	7.9-8.4	0-10	0	0	0
	38-40	---	---	0	0	---	0
Masham-----	0-5	21-24	7.9-8.4	0-5	0	0	0
	5-16	21-36	7.9-8.4	0-5	0	0	0
	16-35	---	---	---	---	---	---
Gullied land.							
GMLG:							
Grainola-----	0-5	9.0-15	6.6-8.4	0	0	0	0
	5-24	21-35	7.9-8.4	0	0	0	0
	24-30	21-35	7.9-8.4	0	0	0	0
	30-40	---	---	---	---	---	---
Masham-----	0-4	21-24	7.9-8.4	0-5	0	0	0
	4-13	21-36	7.9-8.4	0-5	0	0	0
	13-25	---	---	---	---	---	---
Lucien-----	0-6	9.0-15	5.6-7.3	0	0	0	0
	6-17	0.0-0.0	5.6-7.3	0	0	0	0
	17-30	---	---	---	---	---	---
GohC:							
Goodnight-----	0-9	4.0-8.0	6.1-8.4	0-2	0	0	0
	9-18	4.0-8.0	6.1-8.4	0-2	0	0	0
	18-25	4.0-8.0	6.1-8.4	0-2	0	0	0
	25-64	4.0-8.0	6.1-8.4	0-2	0	0	0
	64-80	4.0-8.0	6.1-8.4	0-2	0	0	0
GohE:							
Goodnight-----	0-10	4.0-8.0	6.1-8.4	0-2	0	0	0
	10-22	4.0-8.0	6.1-8.4	0-2	0	0	0
	22-32	4.0-8.0	6.1-8.4	0-2	0	0	0
	32-52	4.0-8.0	6.1-8.4	0-2	0	0	0
	52-80	4.0-8.0	6.1-8.4	0-2	0	0	0

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
GooE:							
Goodnight-----	0-6	2.0-7.0	6.1-8.4	0-2	0	0	0
	6-20	4.0-8.0	6.1-8.4	0-2	0	0	0
	20-80	4.0-8.0	6.1-8.4	0-2	0	0	0
GooG:							
Goodnight-----	0-8	2.0-7.0	6.1-8.4	0-2	0	0	0
	8-23	4.0-8.0	6.1-8.4	0-2	0	0	0
	23-45	4.0-8.0	6.1-8.4	0-2	0	0	0
	45-80	4.0-8.0	6.1-8.4	0-2	0	0	0
GraC:							
Grainola-----	0-5	17-21	6.6-8.4	0-2	0	0	0
	5-18	21-36	7.9-8.4	0-5	0	0	0
	18-27	21-36	7.9-8.4	0-10	0	0	0
	27-32	21-36	7.9-8.4	0-10	0	0	0
	32-42	---	---	0	0	---	0
GraD2:							
Grainola-----	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-26	21-36	7.9-8.4	0-5	0	0	0
	26-38	21-36	7.9-8.4	0-10	0	0	0
	38-48	---	---	0	0	---	0
GrHC:							
Grant-----	0-7	10-16	6.1-7.8	0	0	0	0
	7-11	10-16	6.1-7.8	0	0	0	0
	11-17	11-21	6.1-8.4	0	0	0	0
	17-35	11-21	6.1-8.4	0-2	0	0	0
	35-54	11-21	6.1-8.4	0-2	0	0	0
	54-58	---	---	0-5	---	---	---
Huska-----	0-6	8.0-16	5.6-7.8	0	0	0.0-8.0	8-18
	6-17	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	17-32	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	32-40	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	40-50	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	50-54	---	---	---	---	---	---
GrIE:							
Grainola-----	0-7	17-21	6.6-8.4	0-2	0	0	0
	7-12	21-36	7.9-8.4	0-5	0	0	0
	12-27	21-36	7.9-8.4	0-10	0	0	0
	27-38	21-36	7.9-8.4	0-10	0	0	0
	38-46	---	---	0	0	---	---
Ironmound-----	0-7	7.0-11	5.6-8.4	0	0	0	0
	7-18	10-17	6.1-8.4	0	0	0	0
	18-22	---	---	---	---	---	---
GrLE:							
Grainola-----	0-8	17-21	6.6-8.4	0-2	0	0	0
	8-20	21-36	7.9-8.4	0-5	0	0	0
	20-27	21-36	7.9-8.4	0-10	0	0	0
	27-30	---	---	0	0	---	0
Lucien-----	0-7	9.0-15	5.6-7.3	0	0	0	0
	7-12	0.0-0.0	5.6-7.3	0	0	0	0
	12-15	---	---	---	---	---	---

## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
HaGD4:							
Harrah-----	0-4	7.0-11	4.5-7.3	0	0	0	0
	4-22	11-21	4.5-7.3	0	0	0	0
	22-42	11-21	4.5-7.3	0	0	0	0
	42-54	11-21	4.5-7.3	0	0	0	0
	54-72	11-21	4.5-7.3	0	0	0	0
	72-80	11-21	4.5-7.3	0	0	0	0
Gullied land.							
HarC:							
Harrah-----	0-7	7.0-11	4.5-7.3	0	0	0	0
	7-16	4.0-11	4.5-7.3	0	0	0	0
	16-39	11-21	4.5-7.3	0	0	0	0
	39-64	11-21	4.5-7.3	0	0	0	0
	64-72	11-21	4.5-7.3	0	0	0	0
	72-80	11-21	4.5-7.3	0	0	0	0
HarC2:							
Harrah-----	0-8	7.0-11	4.5-7.3	0	0	0	0
	8-30	11-21	4.5-7.3	0	0	0	0
	30-63	11-21	4.5-7.3	0	0	0	0
	63-80	11-21	4.5-7.3	0	0	0	0
HarG:							
Harrah-----	0-6	7.0-11	4.5-7.3	0	0	0	0
	6-12	4.0-11	4.5-7.3	0	0	0	0
	12-32	11-21	4.5-7.3	0	0	0	0
	32-54	11-21	4.5-7.3	0	0	0	0
	54-72	11-21	4.5-7.3	0	0	0	0
	72-80	11-21	4.5-7.3	0	0	0	0
HawB:							
Hawley-----	0-10	3.0-7.0	5.6-7.8	0	0	0	0
	10-24	4.0-11	6.1-8.4	0	0	0	0
	24-38	4.0-11	6.1-8.4	0	0	0	0
	38-49	4.0-11	6.6-8.4	0	0	0	0
	49-80	3.0-16	6.6-8.4	0	0	0	0
ICGD3:							
Ironmound-----	0-5	10-15	5.6-8.4	0	0	0	0
	5-12	10-21	6.1-8.4	0	0	0	0
	12-20	---	---	---	---	---	---
Coyle-----	0-8	10-16	5.6-7.8	0	0	0	0
	8-21	13-21	5.6-7.8	0	0	0	0
	21-35	11-21	5.6-7.8	0	0	0	0
	35-40	---	---	---	---	---	---
Grainola-----	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-22	21-36	7.9-8.4	0-5	0	0	0
	22-34	21-36	7.9-8.4	0-10	0	0	0
	34-40	---	---	---	---	---	---
IrCE:							
Ironmound-----	0-6	7.0-11	5.6-8.4	0	0	0	0
	6-15	10-21	6.1-8.4	0	0	0	0
	15-20	---	---	---	---	---	---

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
IrCE:							
Coyle-----	0-8	10-15	5.6-8.4	0	0	0	0
	8-16	13-21	5.6-7.8	0	0	0	0
	16-26	13-21	5.6-7.8	0	0	0	0
	26-40	---	---	---	---	---	---
IroC2:							
Ironmound-----	0-7	10-15	5.6-8.4	0	0	0	0
	7-16	10-21	6.1-8.4	0	0	0	0
	16-40	---	---	---	---	---	---
KgfB:							
Kingfisher-----	0-10	9.0-16	6.1-7.8	0	0	0	0
	10-22	16-21	6.6-8.4	0	0	0	0
	22-32	16-24	6.6-8.4	0	0	0	0
	32-38	16-24	6.6-8.4	0	0	0	0
	38-40	---	---	---	---	---	---
KinC2:							
Kingfisher-----	0-8	9.0-16	6.1-7.8	0	0	0	0
	8-13	16-21	6.6-8.4	0	0	0	0
	13-20	16-21	6.6-8.4	0	0	0	0
	20-27	16-24	6.6-8.4	0	0	0	0
	27-40	---	---	---	---	---	---
KonB:							
Konawa-----	0-7	2.0-7.0	5.1-6.5	0	0	0	0
	7-12	2.0-10	5.1-6.5	0	0	0	0
	12-25	11-18	5.1-7.3	0	0	0	0
	25-38	11-18	5.1-7.3	0	0	0	0
	38-52	11-18	5.1-7.3	0	0	0	0
	52-80	5.0-18	5.1-6.5	0	0	0	0
KonD2:							
Konawa-----	0-9	2.0-7.0	5.1-6.5	0	0	0	0
	9-23	11-18	5.1-7.3	0	0	0	0
	23-38	11-18	5.1-7.3	0	0	0	0
	38-49	11-18	5.1-7.3	0	0	0	0
	49-70	5.0-18	5.1-6.5	0	0	0	0
	70-80	5.0-18	5.1-6.5	0	0	0	0
KrdA:							
Kirkland-----	0-8	10-16	5.6-7.3	0	0	0.0-1.0	1-4
	8-19	24-36	6.6-7.8	0-2	0	0.0-2.0	2-12
	19-41	24-36	6.6-7.8	0-2	0	0.0-2.0	2-12
	41-59	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	59-85	21-36	7.4-8.4	0-2	0-2	2.0-4.0	3-16
	85-96	---	---	---	---	---	---
KrkB:							
Kirkland-----	0-9	16-21	5.6-7.3	0	0	0.0-1.0	1-4
	9-34	24-36	6.6-7.8	0-2	0	0.0-2.0	2-12
	34-48	24-36	6.6-7.8	0-2	0	0.0-2.0	2-12
	48-57	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	57-82	21-36	7.4-8.4	0-2	0-2	2.0-4.0	3-16
	82-98	---	---	---	---	---	---

## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	<u>In</u>	<u>meq/100 g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
LarA:							
Lawrie-----	0-8	10-16	6.1-7.8	0	0	0	0
	8-20	10-16	6.1-7.8	0	0	0	0
	20-27	11-21	6.1-8.4	0	0	0	0
	27-38	11-21	6.1-8.4	0	0	0	0
	38-45	11-21	6.1-8.4	0	0	0	0
	45-80	17-24	7.9-8.4	0-2	0	0	0
LawA:							
Lawrie-----	0-10	10-16	6.1-7.8	0	0	0	0
	10-26	11-21	6.1-8.4	0	0	0	0
	26-34	11-21	6.1-8.4	0	0	0	0
	34-51	17-24	7.9-8.4	0-2	0	0	0
	51-72	11-21	6.1-8.4	0-2	0	0	0
	72-90	17-24	7.9-8.4	0-2	0	0	0
LerA:							
Lebron-----	0-5	24-36	7.4-8.4	0-5	0	0	0
	5-14	21-36	7.4-8.4	0-5	0	0	0
	14-28	6.0-36	7.4-8.4	0-5	0	0	0
	28-80	2.0-11	7.4-8.4	0-5	0	0	0
LitB:							
Littleaxe-----	0-5	6.0-12	5.1-7.3	0	0	0	0
	5-9	2.0-8.0	4.5-6.5	0	0	0	0
	9-30	3.0-8.0	4.5-6.5	0	0	0	0
	30-45	3.0-8.0	4.5-6.5	0	0	0	0
	45-58	9.0-18	4.5-7.3	0	0	0	0
	58-60	---	---	---	---	---	---
LitC2:							
Littleaxe-----	0-6	6.0-12	5.1-7.3	0	0	0	0
	6-17	3.0-8.0	4.5-6.5	0	0	0	0
	17-41	3.0-8.0	4.5-6.5	0	0	0	0
	41-52	9.0-18	4.5-6.5	0	0	0	0
	52-60	---	---	---	---	---	---
M-W. Miscellaneous water							
MaID:							
Masham-----	0-4	21-24	7.9-8.4	0-5	0	0	0
	4-16	21-36	7.9-8.4	0-5	0	0	0
	16-35	---	---	---	---	---	---
Ironmound-----	0-6	10-15	5.6-8.4	0	0	0	0
	6-11	10-21	6.1-8.4	0	0	0	0
	11-36	---	---	---	---	---	---
MaIG:							
Masham-----	0-4	21-24	7.9-8.4	0-5	0	0	0
	4-12	21-36	7.9-8.4	0-5	0	0	0
	12-20	---	---	---	---	---	---
Ironmound-----	0-6	10-15	5.6-8.4	0	0	0	0
	6-15	10-21	6.1-8.4	0	0	0	0
	15-20	---	---	---	---	---	---

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
<b>MinB:</b>							
Minco-----	0-11	5.0-11	5.6-7.3	0	0	0	0
	11-26	5.0-11	5.6-8.4	0	0	0	0
	26-37	5.0-11	5.6-8.4	0	0	0	0
	37-58	5.0-11	5.6-8.4	0	0	0	0
	58-80	5.0-11	6.1-8.4	0	0	0	0
<b>MinC:</b>							
Minco-----	0-10	5.0-11	5.6-7.3	0	0	0	0
	10-29	5.0-11	5.6-8.4	0	0	0	0
	29-40	5.0-11	5.6-8.4	0	0	0	0
	40-54	5.0-11	5.6-8.4	0	0	0	0
	54-80	5.0-11	6.1-8.4	0	0	0	0
<b>MinD:</b>							
Minco-----	0-12	5.0-11	5.6-7.3	0	0	0	0
	12-26	5.0-11	5.6-8.4	0	0	0	0
	26-47	5.0-11	5.6-8.4	0	0	0	0
	47-67	5.0-11	5.6-8.4	0	0	0	0
	67-80	5.0-11	6.1-8.4	0	0	0	0
<b>MinF:</b>							
Minco-----	0-9	5.0-11	5.6-7.3	0	0	0	0
	9-19	5.0-11	5.6-8.4	0	0	0	0
	19-39	5.0-11	5.6-8.4	0	0	0	0
	39-64	5.0-11	5.6-8.4	0	0	0	0
	64-70	5.0-11	5.6-8.4	0	0	0	0
	70-80	5.0-11	6.1-8.4	0	0	0	0
<b>M11A:</b>							
Miller-----	0-9	24-35	7.4-8.4	0	0	0	0
	9-15	21-36	7.4-8.4	0	0	0	0
	15-27	21-36	7.4-8.4	0	0	0	0
	27-41	21-36	7.4-8.4	0-2	0-2	0	0
	41-55	21-36	7.4-8.4	0-2	0-2	0	0
	55-80	21-36	7.4-8.4	0-2	0-2	0	0
<b>MulC:</b>							
Mulhall-----	0-11	10-16	5.6-7.8	0	0	0	0
	11-17	11-18	6.1-7.3	0	0	0	0
	17-32	13-21	6.1-7.8	0	0	0	0
	32-40	13-21	6.1-7.8	0	0	0	0
	40-70	13-21	6.6-8.4	0	0	0	0
	70-82	---	---	---	---	---	---
<b>MulC2:</b>							
Mulhall-----	0-10	10-16	5.6-7.8	0	0	0	0
	10-22	13-21	6.1-7.8	0	0	0	0
	22-36	13-21	6.1-7.8	0	0	0	0
	36-54	13-21	6.6-8.4	0	0	0	0
	54-80	13-21	6.6-8.4	0	0	0	0
	80-90	---	---	---	---	---	---
<b>NavA:</b>							
Navina-----	0-8	6.0-12	5.6-7.8	0	0	0	0
	8-14	11-21	5.6-7.8	0	0	0	0
	14-33	11-21	6.6-7.8	0	0	0	0
	33-41	11-21	6.6-7.8	0	0	0	0
	41-71	7.0-21	6.6-7.8	0	0	0	0
	71-80	2.0-10	6.6-7.8	0	0	0	0



## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
NavB:							
Navina-----	0-7	6.0-12	5.6-7.8	0	0	0	0
	7-16	11-21	5.6-7.8	0	0	0	0
	16-37	11-21	6.6-7.8	0	0	0	0
	37-60	11-21	6.6-7.8	0	0	0	0
	60-71	7.0-21	6.6-7.8	0	0	0	0
	71-80	2.0-10	6.6-7.8	0	0	0	0
NeGD4:							
Newalla-----	0-6	5.0-11	4.5-7.3	0	0	0	0
	6-11	12-21	4.5-7.3	0	0	0	0
	11-28	24-36	4.5-8.4	0-2	0	0	0-4
	28-46	24-36	7.4-8.4	0-2	0	0	0-8
	46-60	---	---	---	---	---	---
Gullied land.							
NewB:							
Newalla-----	0-6	5.0-11	4.5-7.3	0	0	0	0
	6-12	5.0-11	4.5-7.3	0	0	0	0
	12-19	12-21	4.5-7.3	0	0	0	0
	19-41	24-36	4.5-8.4	0-2	0	0	0-4
	41-46	24-36	7.4-8.4	0-2	0	0	0-8
	46-52	---	---	---	---	---	---
NorA:							
Norge-----	0-11	10-16	5.6-7.3	0	0	0	0
	11-16	10-16	5.6-7.3	0	0	0	0
	16-23	11-21	5.6-7.3	0	0	0	0
	23-43	17-21	5.6-7.8	0	0	0	0
	43-61	17-21	5.6-7.8	0	0	0	0
	61-80	17-30	6.1-8.4	0-2	0	0	0
NorB:							
Norge-----	0-12	10-16	5.6-7.3	0	0	0	0
	12-18	11-21	5.6-7.3	0	0	0	0
	18-24	17-21	5.6-7.8	0	0	0	0
	24-45	17-21	5.6-7.8	0	0	0	0
	45-62	17-30	6.1-8.4	0-2	0	0	0
	62-80	17-30	6.6-8.4	0-2	0	0	0
NorC2:							
Norge-----	0-8	10-16	5.6-7.3	0	0	0	0
	8-15	17-21	5.6-7.8	0	0	0	0
	15-33	17-21	5.6-7.8	0	0	0	0
	33-43	17-21	5.6-7.8	0	0	0	0
	43-65	17-30	6.1-7.8	0-2	0	0	0
	65-80	17-30	6.6-8.4	0-2	0	0	0
OWHD:							
Oil waste land.							
Huska-----	0-8	8.0-16	5.6-7.8	0	0	0.0-8.0	8-18
	8-19	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	19-40	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	40-51	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	51-59	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	59-80	---	---	---	---	---	---

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
PieB:							
Piedmont-----	0-8	16-21	6.1-7.3	0	0	0	0
	8-17	21-33	6.6-8.4	0-2	0	0	0
	17-27	21-33	6.6-8.4	0-2	0	0	0
	27-32	21-33	7.9-8.4	0-5	0	0	0
	32-40	---	---	---	---	---	---
PieC2:							
Piedmont-----	0-7	16-21	6.1-7.3	0	0	0	0
	7-14	21-33	6.6-8.4	0-2	0	0	0
	14-27	21-33	7.9-8.4	0-5	0	0	0
	27-40	---	---	---	---	---	---
PIT.							
Pits							
PukA:							
Pulaski-----	0-8	7.0-11	5.6-7.3	0	0	0	0
	8-28	7.0-11	5.6-7.3	0	0	0	0
	28-80	4.0-11	5.6-7.8	0	0	0	0
PulA:							
Pulaski-----	0-10	7.0-11	5.6-7.3	0	0	0	0
	10-14	7.0-11	5.6-7.3	0	0	0	0
	14-36	7.0-11	5.6-7.3	0	0	0	0
	36-80	4.0-11	5.6-7.8	0	0	0	0
RenB:							
Renfrow-----	0-11	11-16	6.1-7.8	0	0	0	0
	11-19	14-24	6.1-7.8	0	0	0	0
	19-33	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	33-66	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	66-72	21-33	7.9-8.4	0	0	0.0-2.0	0-4
	72-80	---	---	---	---	---	---
RenC:							
Renfrow-----	0-10	11-16	6.1-7.8	0	0	0	0
	10-16	14-24	6.1-7.8	0	0	0	0
	16-27	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	27-38	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	38-67	21-33	6.6-8.4	0	0	0.0-2.0	0-4
	67-80	---	---	---	---	---	---
RewC2:							
Renfrow-----	0-10	17-21	6.1-7.8	0	0	0	0
	10-24	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	24-37	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	37-54	21-33	6.6-8.4	0	0	0.0-2.0	0-4
	54-63	21-33	7.9-8.4	0	0	0.0-2.0	0-4
	63-80	---	---	---	---	---	---
RinB:							
Renthin-----	0-7	15-35	6.1-7.3	0	0	0	0
	7-12	20-30	6.1-7.8	0	0	0	0
	12-21	20-40	6.6-8.4	0	0	0	0
	21-32	20-40	7.9-8.4	0-5	0	0	0
	32-54	20-40	7.9-8.4	0-5	0	0	0
	54-60	---	---	---	---	---	---

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
RnnC2:							
Renthin-----	0-10	15-35	6.1-7.3	0	0	0	0
	10-20	20-40	6.6-8.4	0	0	0	0
	20-33	20-40	7.9-8.4	0-2	0	0	0
	33-45	20-40	7.9-8.4	0-2	0	0	0
	45-50	20-40	7.9-8.4	0-5	0	0	0
	50-60	---	---	---	---	---	---
SDGD4:							
Stephenville-----	0-5	7.0-12	5.1-6.5	0	0	0	0
	5-12	11-21	4.5-6.0	0	0	0	0
	12-22	11-21	4.5-6.0	0	0	0	0
	22-36	---	---	---	---	---	---
Darsil-----	0-4	1.0-6.0	5.1-7.8	0	0	0	0
	4-12	1.0-6.0	5.1-7.8	0	0	0	0
	12-24	---	---	---	---	---	---
Gullied land.							
SDND:							
Stephenville-----	0-7	7.0-12	5.1-6.5	0	0	0	0
	7-13	4.0-10	5.1-6.5	0	0	0	0
	13-28	11-21	4.5-6.0	0	0	0	0
	28-36	---	---	---	---	---	---
Darsil-----	0-5	1.0-6.0	5.1-7.8	0	0	0	0
	5-18	1.0-6.0	5.1-7.8	0	0	0	0
	18-20	---	---	---	---	---	---
Newalla-----	0-4	5.0-11	4.5-7.3	0	0	0	0
	4-8	5.0-11	4.5-7.3	0	0	0	0
	8-13	12-21	4.5-7.3	0	0	0	0
	13-27	24-36	4.5-8.4	0-2	0	0	0-4
	27-48	24-36	7.4-8.4	0-2	0	0	0-8
	48-80	---	---	---	---	---	---
SDND2:							
Stephenville-----	0-7	7.0-12	5.1-6.5	0	0	0	0
	7-12	11-21	4.5-6.0	0	0	0	0
	12-25	11-21	4.5-6.0	0	0	0	0
	25-30	11-21	4.5-6.0	0	0	0	0
	30-36	---	---	---	---	---	---
Darsil-----	0-6	1.0-6.0	5.1-7.8	0	0	0	0
	6-11	1.0-6.0	5.1-7.8	0	0	0	0
	11-24	---	---	---	---	---	---
Newalla-----	0-5	5.0-11	4.5-7.3	0	0	0	0
	5-12	12-21	4.5-7.3	0	0	0	0
	12-26	24-36	4.5-8.4	0-2	0	0	0-4
	26-40	24-36	4.5-8.4	0-2	0	0	0-4
	40-80	---	---	---	---	---	---

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
<b>SlaB:</b>							
Slaughterville-----	0-11	6.0-11	5.6-7.3	0	0	0	0
	11-20	6.0-11	5.6-7.3	0	0	0	0
	20-34	6.0-11	6.1-8.4	0	0	0	0
	34-42	6.0-11	6.1-8.4	0	0	0	0
	42-53	3.0-11	6.6-8.4	0	0	0	0
	53-80	6.0-11	6.6-8.4	0	0	0	0
<b>SlaD:</b>							
Slaughterville-----	0-8	6.0-11	5.6-7.3	0	0	0	0
	8-16	6.0-11	5.6-7.3	0	0	0	0
	16-34	6.0-11	6.1-8.4	0	0	0	0
	34-50	6.0-11	6.1-8.4	0	0	0	0
	50-80	3.0-11	6.6-8.4	0	0	0	0
<b>SlaF:</b>							
Slaughterville-----	0-8	6.0-11	5.6-7.3	0	0	0	0
	8-16	6.0-11	5.6-7.3	0	0	0	0
	16-34	6.0-11	6.6-8.4	0	0	0	0
	34-48	6.0-11	6.6-8.4	0	0	0	0
	48-63	3.0-11	6.6-8.4	0	0	0	0
	63-80	3.0-11	6.6-8.4	0	0	0	0
<b>StDC:</b>							
Stephenville-----	0-6	7.0-12	5.1-6.5	0	0	0	0
	6-14	4.0-10	5.1-6.5	0	0	0	0
	14-23	11-21	4.5-6.0	0	0	0	0
	23-30	11-21	4.5-6.0	0	0	0	0
	30-40	---	---	---	---	---	---
<b>Darsil-----</b>	0-4	1.0-6.0	5.1-7.8	0	0	0	0
	4-15	1.0-6.0	5.1-7.8	0	0	0	0
	15-20	---	---	---	---	---	---
<b>StDC2:</b>							
Stephenville-----	0-8	7.0-12	5.1-6.5	0	0	0	0
	8-21	11-21	4.5-6.0	0	0	0	0
	21-32	11-21	4.5-6.0	0	0	0	0
	32-38	11-21	4.5-6.0	0	0	0	0
	38-44	---	---	---	---	---	---
<b>Darsil-----</b>	0-8	1.0-6.0	5.1-7.8	0	0	0	0
	8-16	1.0-6.0	5.1-7.8	0	0	0	0
	16-30	---	---	---	---	---	---
<b>StDE:</b>							
Stephenville-----	0-7	7.0-12	5.1-6.5	0	0	0	0
	7-14	4.0-10	5.1-6.5	0	0	0	0
	14-27	11-21	4.5-6.0	0	0	0	0
	27-40	---	---	---	---	---	---
<b>Darsil-----</b>	0-7	1.0-6.0	5.1-7.8	0	0	0	0
	7-16	1.0-6.0	5.1-7.8	0	0	0	0
	16-20	---	---	---	---	---	---

## Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	<u>In</u>	<u>meq/100 g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
SteB:							
Stephenville-----	0-6	7.0-12	5.1-6.5	0	0	0	0
	6-12	4.0-10	5.1-6.5	0	0	0	0
	12-22	11-21	4.5-6.0	0	0	0	0
	22-35	11-21	4.5-6.0	0	0	0	0
	35-40	---	---	---	---	---	---
SteC2:							
Stephenville-----	0-8	7.0-12	5.1-6.5	0	0	0	0
	8-29	11-21	4.5-6.0	0	0	0	0
	29-40	---	---	---	---	---	---
SUND:							
Stephenville-----	0-9	7.0-12	5.1-6.5	0	0	0	0
	9-28	11-21	4.5-6.0	0	0	0	0
	28-40	---	---	---	---	---	---
Urban land.							
Newalla-----	0-6	7.0-15	4.5-7.3	0	0	0	0
	6-11	12-21	4.5-7.3	0	0	0	0
	11-34	24-36	4.5-8.4	0-2	0	0	0-4
	34-58	24-36	4.5-8.4	0-2	0	0	0-4
	58-72	---	---	---	---	---	---
TelB:							
Teller-----	0-9	7.0-13	5.6-7.3	0	0	0	0
	9-15	7.0-13	5.6-7.3	0	0	0	0
	15-31	11-18	5.6-7.3	0	0	0	0
	31-44	11-18	5.6-7.3	0	0	0	0
	44-55	7.0-13	5.6-7.8	0	0	0	0
	55-80	7.0-13	5.6-7.8	0	0	0	0
TelC2:							
Teller-----	0-4	7.0-13	5.6-7.3	0	0	0	0
	4-25	7.0-13	5.6-7.3	0	0	0	0
	25-44	11-18	5.6-7.3	0	0	0	0
	44-59	11-18	5.6-7.3	0	0	0	0
	59-80	11-18	5.6-7.3	0	0	0	0
TriA:							
Tribbey-----	0-6	7.0-11	5.6-8.4	0	0	0	0
	6-45	7.0-11	5.6-8.4	0	0	0	0
	45-80	4.0-11	5.6-8.4	0	0	0	0
URB.							
Urban land							
W.							
Water							
YaaA:							
Yahola-----	0-7	7.0-11	7.4-8.4	0-1	0	0	0
	7-14	4.0-11	7.9-8.4	1-5	0	0	0
	14-34	4.0-11	7.9-8.4	1-5	0	0	0
	34-46	4.0-11	7.9-8.4	1-5	0	0	0
	46-80	4.0-11	7.9-8.4	1-5	0	0	0

## Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
<b>YahA:</b>							
Yahola-----	0-6	7.0-11	7.4-8.4	0-1	0	0	0
	6-34	4.0-11	7.9-8.4	1-5	0	0	0
	34-80	4.0-11	7.9-8.4	1-5	0	0	0
<b>ZaHC:</b>							
Zaneis-----	0-12	3.0-11	5.6-7.3	0	0	0	0
	12-25	11-18	5.6-7.3	0	0	0	0
	25-32	13-23	5.6-7.3	0	0	0	0
	32-52	11-18	6.1-7.8	0	0	0	0
	52-60	---	---	---	---	---	---
<b>Huska-----</b>	0-5	8.0-16	5.6-7.8	0	0	0.0-8.0	8-18
	5-13	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	13-20	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	20-39	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	39-59	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	59-67	---	---	---	---	---	---
<b>ZanB:</b>							
Zaneis-----	0-10	10-16	5.6-7.3	0	0	0	0
	10-17	11-18	5.6-7.3	0	0	0	0
	17-28	13-23	5.6-7.3	0	0	0	0
	28-38	13-23	5.6-7.3	0	0	0	0
	38-44	11-18	6.1-7.8	0	0	0	0
	44-54	---	---	---	---	---	---
<b>ZanC:</b>							
Zaneis-----	0-8	10-16	5.6-7.3	0	0	0	0
	8-14	11-18	5.6-7.3	0	0	0	0
	14-25	11-18	5.6-7.3	0	0	0	0
	25-31	13-23	5.6-7.3	0	0	0	0
	31-47	13-23	6.1-7.3	0	0	0	0
	47-54	---	---	---	---	---	---
<b>ZanC2:</b>							
Zaneis-----	0-8	10-16	5.6-7.3	0	0	0	0
	8-15	11-18	5.6-7.3	0	0	0	0
	15-26	13-23	5.6-7.3	0	0	0	0
	26-43	13-23	6.1-7.3	0	0	0	0
	43-56	11-18	6.1-7.8	0	0	0	0
	56-60	---	---	---	---	---	---

## Chemical Analyses of Selected Soils

The results of chemical analysis of several pedons are given in the table "Chemical Properties of Selected Soils." The data are for soils sampled at carefully selected sites. The pedons are representative of the series described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

Most determinations, except for those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (8).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).

Extractable acidity—barium chloride-triethanolamine IV (6H5a).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Reaction (pH)—calcium chloride (8C1f).

Reaction (pH)—1:1 water dilution (8C1f).

## Chemical Properties of Selected Soils

(The location of the sampled pedons is given at the end of the table. TR means trace. Dashes indicate that data were not available)

Soil name and sample number	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate)				Extract-able acidity per 100 grams of soil	Cation-exchange capacity		Base saturation		pH			
				Ca	Mg	Na	K		Sum of cations	Ammonium acetate	Sum of Ammonium acetate	Pct	Ammonium acetate	Pct	CaCl <sub>2</sub> 1:2	H <sub>2</sub> O 1:1
-----Milliequivalents per 100 grams of soil-----																
Bathel: (S920K-083-006)	In															
	0-8	Ap	0.63	---	---	---	---	3.1	---	---	---	---	---	4.0	4.2	
	8-12	A	0.24	---	---	---	---	1.3	---	---	---	---	---	5.3	5.8	
	12-18	E	0.16	---	---	---	---	0.7	---	---	---	---	---	5.8	6.4	
	18-22	Bt	0.35	---	---	---	---	3.0	---	---	---	---	---	6.1	6.8	
	22-35	Btg1	0.27	---	---	---	---	3.3	---	---	---	---	---	6.2	7.0	
	35-45	Btg2	0.12	---	---	---	---	3.1	---	---	---	---	---	5.9	6.7	
Bethany: (S890K-083-001)	45-51	BCg1	0.07	---	---	---	---	2.5	---	---	---	---	---	5.8	6.6	
	51-66	BCg2	0.05	---	---	---	---	0.9	---	---	---	---	---	5.7	6.5	
	66-86	2Bt	0.03	---	---	---	---	1.9	---	---	---	---	---	5.7	6.5	
	17-31	Bt1	0.47	19.1	10.7	1.6	0.5	---	31.9	28.7	100	100	100	7.0	7.9	
	31-40	Bt2	0.26	---	11.5	3.2	0.5	---	---	26.6	100	100	100	7.7	8.5	
Coyle: (S910K-083-001)	40-51	Bt3	0.18	---	11.4	4.2	0.4	---	---	25.6	100	100	100	7.7	8.5	
	0-5	Ap	1.25	5.1	1.6	0.1	0.5	4.7	7.3	8.8	61	83	83	5.0	5.6	
	5-10	BA	0.98	6.2	2.3	0.1	0.4	5.0	9.0	10.6	64	85	85	5.1	5.7	
	10-14	Bt1	0.93	7.5	3.2	0.1	0.3	4.9	11.1	12.2	69	91	91	5.3	6.0	
	14-18	Bt2	0.73	7.7	3.5	0.1	0.2	4.3	11.5	12.8	73	90	90	5.4	6.1	
	18-27	Bct	0.44	6.0	3.0	0.1	0.2	3.8	9.3	9.8	71	95	95	5.5	6.2	
	27-37	Cr	0.21	3.6	1.9	TR	0.1	1.5	5.6	5.6	79	100	100	6.1	6.8	
	37-47	R	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Darsil: (S910K-083-007)	0-3	A	1.03	0.9	0.4	0.1	0.1	4.4	5.9	4.8	25	31	31	4.1	4.7
		3-14	EC	0.25	---	0.2	0.1	TR	1.9	2.2	1.8	14	17	17	4.0	4.5
14-24		Cr1	0.06	0.7	1.5	0.1	0.1	2.1	4.5	3.4	53	71	71	4.6	5.3	
24-35		Cr2	0.14	0.9	2.0	0.1	0.1	3.2	6.3	5.2	49	60	60	4.2	4.9	
Ironmound: (S920K-083-005)		0-4	Ap	1.34	---	---	---	---	2.9	---	---	---	---	---	5.3	5.9
	4-10	Bwd	0.50	---	---	---	---	1.7	---	---	---	---	---	5.3	6.1	
	10-18	Bw	0.39	---	---	---	---	3.0	---	---	---	---	---	5.5	6.3	
	18-23	C/Cr	0.13	---	---	---	---	0.9	---	---	---	---	---	5.8	6.6	
	23-34	Cr1	0.06	---	---	---	---	0.3	---	---	---	---	---	5.9	6.7	
	34-51	Cr2	0.03	---	---	---	---	0.5	---	---	---	---	---	6.6	7.2	
	51+	R	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Kingfisher: (S900K-083-004)	0-7	Ap	2.09	9.6	3.3	TR	0.4	3.2	16.5	12.1	81	100	100	6.1	6.6
		7-12	Bt1	1.02	10.0	4.1	TR	0.2	4.1	18.4	15.0	78	95	95	5.7	6.5
12-18		2Bt2	0.55	11.6	4.9	TR	0.2	2.9	19.6	15.4	85	100	100	6.3	7.1	
18-25		2BC	0.45	10.1	4.1	TR	0.1	2.1	16.4	14.5	87	99	99	5.7	6.6	



Chemical Properties of Selected Soils-Continued

Soil name and sample number	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate)				Extract-able acidity	Cation-exchange capacity		Base saturation		pH	
				Ca	Mg	Na	K		Sum of cations	Ammonium acetate	Sum of cations	Ammonium acetate	CaCl <sub>2</sub> 1:2	H <sub>2</sub> O 1:1
Kingfisher: (S90OK-083-005)	In			7.7	2.9	TR	0.3	6.2	17.1	12.5	64	87	4.8	5.5
	0-8	Ap	1.87	11.0	4.0	TR	0.3	4.5	19.8	17.0	77	90	5.3	6.1
	8-13	Bt1	1.22	18.0	4.1	TR	0.3	1.4	23.8	17.7	94	100	7.0	7.6
	13-20	Bt2	0.57	---	5.5	0.1	0.2	---	---	11.7	100	100	7.5	8.1
	20-27	BC	0.27	---	---	---	---	---	---	---	---	---	---	---
Kirkland: (S89OK-083-002)	8-18	Bt1	0.51	---	10.3	2.1	0.6	---	---	28.7	100	100	7.4	8.4
	18-29	Bt2	0.30	---	10.9	4.2	0.5	---	---	27.8	100	100	7.7	8.4
	29-41	Bt3	0.24	---	10.9	5.1	0.5	---	---	27.5	100	100	7.7	8.5
	41-50	Bt4	0.15	---	11.4	5.7	0.6	---	---	30.5	100	100	7.6	8.5
Kirkland: (S91OK-083-005)	0-8	Ap	1.31	8.9	4.1	0.2	0.4	7.8	21.4	17.5	64	78	4.8	5.4
	8-18	Bt1	0.72	20.7	8.6	0.9	0.4	4.9	35.5	31.7	86	97	6.2	6.9
	18-28	Bt2	0.58	19.8	9.7	1.6	0.4	2.6	34.1	31.8	92	99	7.0	7.7
	28-40	Btk	0.37	---	10.2	2.6	0.5	---	---	31.0	100	100	7.7	8.3
	40-50	2Bt1	0.22	---	8.4	3.1	0.4	1.4	---	31.2	---	100	7.7	8.0
Lawrie: (S91OK-083-004)	50-59	2Bt2	0.15	23.6	9.3	3.7	0.4	2.4	39.4	33.3	94	100	7.5	7.9
	59-73	2Bt3	0.10	19.8	9.3	4.0	0.5	2.2	35.8	32.9	94	100	7.3	7.7
	73-85	2Bt4	0.05	---	8.3	3.2	0.4	---	---	26.7	100	100	7.5	7.8
	85-96	3Cr	0.01	12.2	5.5	2.5	0.3	0.6	21.1	19.2	97	100	7.2	7.4
Lebron: (S92OK-083-004)	0-6	Ap	0.89	5.4	1.7	0.1	0.2	4.9	12.3	9.0	60	82	5.9	6.5
	6-10	Ad	0.77	5.2	1.7	0.1	0.1	4.9	12.0	9.2	59	77	4.8	5.3
	10-19	Bt	0.79	12.1	4.6	0.1	0.3	6.0	23.1	18.8	74	91	4.7	5.2
	19-26	Bt1b	0.93	14.9	5.7	0.2	0.3	6.2	27.3	22.9	77	92	5.4	6.0
	26-34	Bt2b	0.74	12.9	6.1	0.2	0.4	6.0	25.6	22.0	77	89	5.5	6.0
Lebron: (S92OK-083-004)	34-51	Bt3b	0.24	10.3	4.3	0.2	0.2	3.4	18.4	15.9	82	94	5.6	6.2
	51-72	Bt4b	0.14	9.8	3.8	0.2	0.3	1.8	15.9	14.2	89	99	6.1	6.7
	72-82	Btkb	0.10	---	6.2	0.2	0.3	---	---	15.1	100	100	7.6	8.0
	82-89	Bckb	0.05	---	5.8	0.2	0.3	---	---	13.2	100	100	7.7	8.1
Lebron: (S92OK-083-004)	0-5	Ap	1.16	---	---	---	---	---	---	---	---	---	7.4	7.8
	5-9	Ad	1.00	---	---	---	---	---	---	---	---	---	7.5	7.9
	9-14	A	0.83	---	---	---	---	---	---	---	---	---	7.5	8.0
	14-18	C1	0.70	---	---	---	---	---	---	---	---	---	7.6	8.0
	18-28	C2	0.32	---	---	---	---	---	---	---	---	---	7.7	8.3
Masham: (S91OK-083-008)	0-4	A	2.06	---	9.0	0.1	0.5	1.6	---	18.7	---	100	7.0	7.2
	4-8	Bw	0.47	---	5.9	---	0.2	---	---	14.3	100	100	4.8	8.0
	8-13	BC	0.18	---	6.3	---	0.2	---	---	13.8	100	100	7.7	8.2
	13-25	Cr1	0.17	---	6.8	---	0.1	---	---	12.3	100	100	7.8	8.3
	25-39	Cr2	0.07	---	12.6	TR	0.2	---	---	12.2	100	100	8.0	8.5
	39-47	2Cr	0.01	4.1	8.7	0.1	0.2	---	13.1	10.7	100	100	7.9	8.4

Chemical Properties of Selected Soils—Continued

Soil name and sample number	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate)				Extract-able acidity per 100 grams of soil-----	Cation-exchange capacity		Base saturation		pH	
				Ca	Mg	Na	K		Sum of cations	Ammonium acetate	Sum of cations	Ammonium acetate	CaCl2 1:2	H2O 1:1
Mulhall: (S91OK-083-002)	In			-----	-----	-----	-----							
	0-3	Ap	1.70	7.8	2.8	0.1	0.5	4.6	15.8	12.2	71	92	5.5	6.1
	3-7	Ad	1.16	8.3	3.4	0.1	0.3	5.5	17.6	14.0	69	86	5.4	6.0
	7-11	Bd	0.72	12.0	6.4	0.1	0.4	5.8	24.7	20.6	77	92	5.6	6.2
	11-19	Bt1	0.98	11.3	5.4	0.2	0.4	6.0	23.3	19.4	74	89	5.4	6.0
	19-23	Bt2	0.45	9.9	5.8	0.1	0.3	4.9	21.0	17.2	77	94	5.8	6.4
	23-40	2Bt3	0.24	8.9	5.7	0.2	0.3	3.4	18.5	14.1	82	100	6.0	6.6
	40-54	2Bt4	0.12	9.6	6.0	0.1	0.3	2.8	18.8	13.5	85	100	6.2	6.8
	54-68	2Bc	0.08	10.8	5.6	0.2	0.4	2.6	19.6	14.1	87	100	6.4	7.0
	68-76	3Bt	0.04	15.4	3.5	0.1	0.2	0.8	20.0	11.3	96	100	7.6	8.0
Mulhall: (S91OK-083-006)	76-81	3Bc	0.01	12.2	3.0	0.1	0.2	---	15.5	9.5	100	100	7.5	8.1
	81-90	3Cr	---	5.5	2.0	0.1	0.1	---	7.7	5.4	100	100	7.6	8.1
	0-6	Ap	2.72	6.2	1.9	0.1	0.4	8.3	16.9	13.2	51	65	4.8	4.9
	6-11	A	1.42	6.9	1.9	0.1	0.2	5.3	14.4	11.5	63	79	5.0	5.4
	11-17	BAt	1.10	7.6	2.6	0.2	0.1	5.2	15.7	12.4	67	85	5.4	5.8
	17-26	Bt1	0.70	8.3	4.3	0.2	0.2	3.9	16.9	15.1	77	86	5.7	6.2
	26-31	Bt2	0.41	9.2	5.3	0.1	0.1	3.7	18.4	15.7	80	94	5.8	6.3
	31-40	Bt3	0.29	7.6	4.6	0.2	0.2	3.2	15.8	14.5	80	87	5.7	6.2
	40-51	2Bt4	0.18	7.0	4.1	0.2	0.4	4.1	15.8	14.4	74	81	5.8	6.3
	51-65	2Bt5	0.12	8.2	3.3	0.2	0.2	2.2	14.1	12.5	84	95	6.4	6.9
Piedmont: (S88OK-083-001)	65-70	2Bc	0.08	8.3	3.7	0.3	0.1	2.9	15.3	11.6	81	100	6.7	7.3
	70-84	2Cr	0.04	6.3	2.9	0.3	0.1	1.4	11.0	9.6	87	100	6.8	7.5
	0-8	A	1.64	13.9	8.5	0.2	0.9	4.9	28.4	25.8	83	91	5.8	6.7
	8-17	Bt1	0.80	16.9	11.5	0.4	0.6	3.4	32.7	30.7	90	95	6.2	7.2
	17-27	Bt2	0.64	16.6	12.0	0.6	0.6	2.2	32.0	29.6	93	100	6.7	7.6
Piedmont: (S88OK-083-002)	27-32	Bc	0.42	---	11.9	0.7	0.4	---	---	21.9	100	100	7.8	8.5
	0-9	A	2.65	14.3	5.7	TR	1.1	6.0	27.1	23.4	78	90	5.8	6.4
	9-14	Bt1	1.29	20.2	8.2	0.1	0.7	5.7	34.9	29.4	84	99	6.0	6.9
	14-21	Bt2	1.09	23.0	11.1	0.1	0.7	---	34.9	33.0	100	100	6.6	7.3
	21-27	Bc	0.86	---	11.2	0.2	0.6	---	---	27.6	100	100	7.6	8.2
Stephenville: (S89OK-083-003)	0-5	A	1.26	4.5	1.0	---	0.4	3.7	9.6	6.4	61	92	5.2	5.8
	5-8	E	0.43	3.1	0.9	---	0.1	2.4	6.5	4.5	63	91	5.3	5.8
	8-18	Bt1	0.54	7.1	4.1	---	0.2	4.1	15.5	12.4	74	92	5.3	6.3
	18-25	Bt2	0.24	4.1	2.9	TR	0.1	2.2	9.3	7.6	76	93	5.1	6.0
	0-10	A	1.51	6.1	2.1	TR	0.2	5.1	13.5	10.2	62	82	5.1	5.6
Zaneis: (S90OK-083-001)	10-17	BA	1.14	7.1	3.1	---	0.2	5.9	16.3	12.6	64	83	5.1	5.8
	17-28	Bt1	0.79	9.4	5.6	TR	0.2	5.4	20.6	17.8	74	85	5.2	5.9
	28-38	Bt2	0.40	9.0	5.3	TR	0.2	5.1	19.6	15.6	74	93	5.4	5.9
	38-44	Bc	0.33	7.4	4.5	TR	0.2	3.1	15.2	12.9	80	94	5.5	6.4

Chemical Properties of Selected Soils—Continued

Soil name and sample number	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate)				Extractable acidity	Cation-exchange capacity		Base saturation		pH
				Ca	Mg	Na	K		Sum of cations	Ammonium acetate	Sum of cations	Ammonium acetate	
	In			-----Milliequivalents per 100 grams of soil-----							Pct	Pct	
Zaneis:													
(S910K-083-003)	0-4	Ap	1.93	6.2	1.4	TR	0.4	4.9	12.9	9.8	62	82	5.1
	4-6	Ad	1.39	6.2	1.6	---	0.3	5.8	13.9	10.5	58	77	4.8
	6-11	BA	1.20	6.5	2.1	TR	0.3	5.8	14.7	11.0	61	81	4.8
	11-18	Bt1	0.88	7.8	3.2	0.1	0.2	5.9	17.2	13.4	66	84	4.9
	18-25	Bt2	0.66	8.8	4.2	0.1	0.3	5.5	18.9	15.4	71	87	5.1
	25-35	Bt3	0.32	6.4	3.5	TR	0.2	1.0	11.1	11.2	91	90	5.0
	35-43	BC	0.15	4.6	2.5	0.1	0.1	3.2	10.5	8.3	70	88	5.1
	43-54	Cr	0.08	4.4	3.2	0.2	0.2	2.5	10.5	8.5	76	94	5.6
	54+	R	0.03	---	---	---	---	---	---	---	---	---	---

## Location of sampled pedons:

Bathel loamy fine sand (S920K-083-006); about 1,800 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 17 N., R. 4 W.

Bethany silt loam (S890K-083-001); about 2,375 feet west and 1,150 feet south of the northeast corner of sec. 23, T. 19 N., R. 2 W. (Inclusion of similar soil in map unit BetA; exchangeable sodium percentage and sodium adsorption ratio are higher than the normal ranges for the series.)

Coyle loam (S920K-083-001); about 1,450 feet east and 1,600 north of the southwest corner of sec. 34, T. 17 N., R. 2 W. (Lab data reflect that the surface layer is slightly outside the normal loam texture, but the data is within the normal range for laboratory error.)

Darsil loamy fine sand (S910K-083-007); about 650 feet east and 300 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W. (The pH of the A and EC horizons is slightly low for the series.)

Ironmound very fine sandy loam (S920K-083-005); about 700 feet west and 1,050 feet north of the southeast corner of sec. 30, T. 19 N., R. 4 W.

Kingfisher loam (S900K-083-004); about 1,500 feet west and 100 north of the southeast corner of sec. 36, T. 20 N., R. 2 W. (Inclusion to map unit CoiC2; mineralogy is siliceous and is outside the range of the series.)

Kingfisher loam (S900K-083-005); about 450 feet south and 100 east of the northwest corner of sec. 5, T. 19 N., R. 2 W. (The pH of the surface layer is slightly high for the series due to the addition of acid-forming fertilizer.)

Kirkland silt loam (S890K-083-002); 2,350 feet south and 2,450 feet east of the northwest corner of sec. 16, T. 19 N., R. 4 W. (Inclusion of similar soil in map unit KirB; exchangeable sodium percentage and sodium adsorption ratio are higher than the normal ranges for the series.)

Kirkland silt loam (S910K-083-005); about 1,000 feet north and 150 feet west of the southeast corner of sec. 36, T. 16 N., R. 4 W. (Reaction is slightly outside of the range for the series because of the addition of acid-forming fertilizer.)

Lawrie loam (S910K-083-004); about 1,800 feet east and 700 feet south of the northeast corner of sec. 27, T. 17 N., R. 1 W.

Lebron clay (S920K-083-004); about 3,800 feet east and 1,200 feet south of the northwest corner of sec. 9, T. 17 N., R. 2 W. (This is the type location for the series.)

Masham silty clay loam (S910K-083-008); about 1,200 feet east and 300 feet south of the northwest corner of sec. 35, T. 15 N., R. 1 W.

Mulhall loam (S910K-083-002); about 1,000 feet west and 100 feet north of the southeast corner of sec. 18, R. 18 W., T. 2 W.

Mulhall loam (S910K-083-006); about 1,250 feet east and 800 feet south of the northwest corner of sec. 19, R. 19 N., T. 2 W.

## Chemical Properties of Selected Soils—Continued

## Location of sampled pedons:

Piedmont silty clay loam (S88OK-083-001); about 200 feet east and 150 feet south of the northwest corner of sec. 18, T. 18 N., R. 4 W.

Piedmont silty clay loam (S88OK-083-002); about 1,800 feet east and 100 feet south of the northwest corner of sec. 18, T. 18 N., R. 4 W. (The clay content is higher than allowed by the range of the series.)

Stephenville fine sandy loam (S89OK-083-003); about 600 feet west and 950 feet north of the southeast corner of sec. 12, T. 15 N., R. 2 W. (The base saturation of the lower part of the argillic horizon is 76, which is outside the range of the series, and the pH is slightly higher than allowed by the range of the series. These data are within the normal range of laboratory error.)

Zaneis loam (S90OK-083-001); about 100 feet east and 100 feet south of the northwest corner of sec. 35, T. 19 N., R. 2 W.

Zaneis fine sandy loam (S91OK-083-003); about 5,000 feet west and 2,500 feet north of the southeast corner of sec. 30, T. 18 N., R. 2 W. (The surface layer of fine sandy loam is not typical for the map unit ZanB but is within the range of the Zaneis series. This pedon is an inclusion to the map unit ZanB.)

## Water Features

The table “Water Features” gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. The table “Water Features” indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding*, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that

it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding			
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency	
AspA: Ashport-----	B		<u>Ft</u>	<u>Ft</u>	<u>Ft</u>					
		March	---	---	---	---	None	Brief	Occasional	
		April	---	---	---	---	None	Brief	Occasional	
		May	---	---	---	---	None	Brief	Occasional	
		June	---	---	---	---	None	Brief	Occasional	
		July	---	---	---	---	None	Brief	Occasional	
		August	---	---	---	---	None	Brief	Occasional	
		September	---	---	---	---	None	Brief	Occasional	
		October	---	---	---	---	None	Brief	Occasional	
Asta: Ashport-----	B	March	---	---	---	---	None	Brief	Frequent	
		April	---	---	---	---	None	Brief	Frequent	
		May	---	---	---	---	None	Brief	Frequent	
		June	---	---	---	---	None	Brief	Frequent	
		July	---	---	---	---	None	Brief	Frequent	
		August	---	---	---	---	None	Brief	Frequent	
		September	---	---	---	---	None	Brief	Frequent	
		October	---	---	---	---	None	Brief	Frequent	
Beta, BetB: Bethany-----	C	Jan-Dec	---	---	---	---	None	---	None	
BocA: Bocox-----	D	January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		July	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None	

## Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding			
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency		
Bt1A: Bathel-----	C		<u>Ft</u>	<u>Ft</u>	<u>Ft</u>						
		January	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		February	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		March	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		April	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		May	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		June	---	---	0.0-1.0	Brief	Frequent	---	None		
		July	---	---	0.0-1.0	Brief	Frequent	---	None		
		August	---	---	0.0-1.0	Brief	Frequent	---	None		
		September	---	---	0.0-1.0	Brief	Frequent	---	None		
		October	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
		November	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None		
December	2.0-3.5	>6.0	0.0-1.0	Brief	Frequent	---	None				
CaaA: Canadian-----	B										
		April	---	---	---	---	None	Very brief	Rare		
		May	---	---	---	---	None	Very brief	Rare		
		June	---	---	---	---	None	Very brief	Rare		
		July	---	---	---	---	None	Very brief	Rare		
		August	---	---	---	---	None	Very brief	Rare		
		September	---	---	---	---	None	Very brief	Rare		
		October	---	---	---	---	None	Very brief	Rare		
		November	---	---	---	---	None	Very brief	Rare		
CAID: Coyle-----	B										
		Jan-Dec	---	---	---	---	None	---	None		
Ashport-----	B										
		March	---	---	---	---	None	Brief	Frequent		
		April	---	---	---	---	None	Brief	Frequent		
		May	---	---	---	---	None	Brief	Frequent		
		June	---	---	---	---	None	Brief	Frequent		
		July	---	---	---	---	None	Brief	Frequent		
		August	---	---	---	---	None	Brief	Frequent		
		September	---	---	---	---	None	Brief	Frequent		
Ironmound-----	C										
		Jan-Dec	---	---	---	---	None	---	None		





Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
Easa: Easpur-----	B		<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
		March	---	---	---	---	None	Brief	Occasional
		April	---	---	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
GadA: Gaddy-----	A	March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
GaGA: Gaddy-----	A	March	---	---	---	---	None	Very brief	Frequent
		April	---	---	---	---	None	Very brief	Frequent
		May	---	---	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		August	---	---	---	---	None	Very brief	Frequent
		September	---	---	---	---	None	Very brief	Frequent
		October	---	---	---	---	None	Very brief	Frequent
Gracemore-----	C	January	0.5-1.5	>6.0	---	---	None	---	None
		February	0.5-1.5	>6.0	---	---	None	---	None
		March	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		April	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		May	0.5-1.5	>6.0	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		August	---	---	---	---	None	Very brief	Frequent
		September	---	---	---	---	None	Very brief	Frequent
		October	---	---	---	---	None	Very brief	Frequent
		November	0.5-1.5	>6.0	---	---	None	---	None
		December	0.5-1.5	>6.0	---	---	None	---	None

Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>					
GMGE4: Grainola-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Masham-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Gullied land.										
GMLG: Grainola-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Masham-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Lucien-----	C	Jan-Dec	---	---	---	---	None	---	None	None
GohC, GohE, GooE, GooG: Goodnight-----	A	Jan-Dec	---	---	---	---	None	---	None	None
GrnC, GrnD2: Grainola-----	D	Jan-Dec	---	---	---	---	None	---	None	None
GrnC: Grant-----	B	Jan-Dec	---	---	---	---	None	---	None	None
Huska-----	D	Jan-Dec	---	---	---	---	None	---	None	None
GrIE: Grainola-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Ironmound-----	C	Jan-Dec	---	---	---	---	None	---	None	None
GrLE: Grainola-----	D	Jan-Dec	---	---	---	---	None	---	None	None
Lucien-----	C	Jan-Dec	---	---	---	---	None	---	None	None

Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
HaGD4: Harrah-----	B	Jan-Dec	---	---	---		None	---	None
Gullied land.									
HarC, HarC2, HarG: Harrah-----	B	Jan-Dec	---	---	---		None	---	None
HawB: Hawley-----	B	April May June July August September October November	---	---	---		None	Very brief Very brief Very brief Very brief Very brief Very brief Very brief	Rare Rare Rare Rare Rare Rare Rare
ICGD3: Ironmound-----	C	Jan-Dec	---	---	---		None	---	None
Coyle-----	B	Jan-Dec	---	---	---		None	---	None
Grainola-----	D	Jan-Dec	---	---	---		None	---	None
IrCE: Ironmound-----	C	Jan-Dec	---	---	---		None	---	None
Coyle-----	B	Jan-Dec	---	---	---		None	---	None
IroC2: Ironmound-----	C	Jan-Dec	---	---	---		None	---	None
KgFB, KinC2: Kingfisher-----	B	Jan-Dec	---	---	---		None	---	None

Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
KonB, KonD2: Konawa-----	B	Jan-Dec	<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
			---	---	---	---	None	---	None
KrdA, KrkB: Kirkland-----	D	Jan-Dec	---	---	---	---	None	---	None
LarA: Lawrie-----	B	March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
LawA: Lawrie-----	B	March	---	---	---	---	None	Very brief	Rare
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare





Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
PukA: Pulaski-----	B		<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
		March	---	---	---	---	None	Very brief	Frequent
		April	---	---	---	---	None	Very brief	Frequent
		May	---	---	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		August	---	---	---	---	None	Very brief	Frequent
		September	---	---	---	---	None	Very brief	Frequent
	October	---	---	---	---	None	Very brief	Frequent	
Pu1A: Pulaski-----	B								
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
	October	---	---	---	---	None	Very brief	Occasional	
RenB, RenC, RewC2: Renfrow-----	D								
		Jan-Dec	---	---	---	---	None	---	None
RinB, RnnC2: Renthin-----	D								
		Jan-Dec	---	---	---	---	None	---	None
SDGD4: Stephenville-----	B								
		Jan-Dec	---	---	---	---	None	---	None
Darsil-----	C								
		Jan-Dec	---	---	---	---	None	---	None
Gullied land. SDND, SDND2: Stephenville-----	B								
		Jan-Dec	---	---	---	---	None	---	None
Darsil-----	C								
		Jan-Dec	---	---	---	---	None	---	None





Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
URB: Urban land----- W. Water	D	Jan-Dec	---	---	---	---	None	---	None
YaaA, YahA: Yahola-----	B	April May June July August September October	---	---	---	---	None	Brief Brief Brief Brief Brief Brief Brief	Occasional Occasional Occasional Occasional Occasional Occasional Occasional
ZaHC: Zaneis-----	B	Jan-Dec	---	---	---	---	None	---	None
Huska-----	D	Jan-Dec	---	---	---	---	None	---	None
ZanB, ZanC, ZanC2: Zaneis-----	B	Jan-Dec	---	---	---	---	None	---	None

## Soil Features

The table “Soil Features” gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. Depth to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as low, moderate, or high, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as low, moderate, or high. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

## Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top In		Uncoated steel	Concrete
AspA, AstA: Ashport-----	---	---	None	Moderate	Low
BetA, BetB: Bethany-----	---	---	None	High	Low
BocA: Bocox-----	---	---	None	Moderate	Low
Bt1A: Bathel-----	---	---	None	Moderate	Low
CaaA: Canadian-----	---	---	None	Low	Low
CAID: Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
Ashport-----	---	---	None	Moderate	Low
Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
CoIC2: Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
CoUB, CoUC: Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
Urban land.					
CoyB, CoyC2: Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
CoZC3: Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
Zaneis-----	Bedrock (paralithic)	40-60	None	Moderate	Low
DAM. Dam					
DerB, DerD, DerE: Derby-----	---	---	None	Low	Moderate

## Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top In		Uncoated steel	Concrete
DiRG: Darsil-----	Bedrock (paralithic)	10-20	None	Low	Moderate
Rock outcrop-----	Bedrock (paralithic)	0-0	None	---	---
DouB, DouD: Dougherty-----	---	---	None	Moderate	Moderate
DUM. Dumps					
EasA: Easpur-----	---	---	None	Moderate	Low
GadA: Gaddy-----	---	---	None	Low	Low
GaGA: Gaddy-----	---	---	None	Low	Low
Gracemore-----	---	---	None	Moderate	Low
GMGE4: Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
Masham-----	Bedrock (paralithic)	10-20	None	High	Low
Gullied land.					
GMLG: Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
Masham-----	Bedrock (paralithic)	10-20	None	High	Low
Lucien-----	Bedrock (paralithic)	10-20	None	Low	Low
GohC, GohE, GooE, GooG: Goodnight-----	---	---	None	Low	Low
GraC, GraD2: Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
GrHC: Grant-----	Bedrock (paralithic)	40-60	None	Moderate	Low
Huska-----	Bedrock (paralithic)	40-60	None	High	Moderate

## Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top In		Uncoated steel	Concrete
GrIE: Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
GrLE: Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
Lucien-----	Bedrock (paralithic)	10-20	None	Low	Low
HaGD4: Harrah-----	---	---	None	Moderate	Moderate
Gullied land.					
HarC, HarC2, HarG: Harrah-----	---	---	None	Moderate	Moderate
HawB: Hawley-----	---	---	None	Low	Moderate
ICGD3: Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
Grainola-----	Bedrock (paralithic)	20-40	None	High	Low
IrCE: Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
Coyle-----	Bedrock (paralithic)	20-40	None	Moderate	Low
IroC2: Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
KgfB, KinC2: Kingfisher-----	Bedrock (paralithic)	20-40	None	Moderate	Low
KonB, KonD2: Konawa-----	---	---	None	Moderate	Moderate
KrdA, KrkB: Kirkland-----	Bedrock (paralithic)	60-99	None	High	Low
LarA, LawA: Lawrie-----	---	---	None	Moderate	Low

## Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top In		Uncoated steel	Concrete
LerA: Lebron-----	---	---	None	High	Low
LitB, LitC2: Littleaxe-----	Bedrock (paralithic)	40-60	None	Moderate	Moderate
M-W. Miscellaneous water					
MaID, MaIG: Masham-----	Bedrock (paralithic)	10-20	None	High	Low
Ironmound-----	Bedrock (paralithic)	10-20	None	Low	Low
MinB, MinC, MinD, MinF: Minco-----	---	---	None	Low	Low
MllA: Miller-----	---	---	None	High	Low
MulC, MulC2: Mulhall-----	Bedrock (paralithic)	60-80	None	Moderate	Low
NavA, NavB: Navina-----	---	---	None	Moderate	Low
NeGD4: Newalla-----	Bedrock (paralithic)	40-60	None	High	Moderate
Gullied land.					
NewB: Newalla-----	Bedrock (paralithic)	40-60	None	High	Moderate
NorA, NorB, NorC2: Norge-----	---	---	None	Moderate	Low
OWHD: Oil waste land.					
Huska-----	Bedrock (paralithic)	40-60	None	High	Moderate
PieB, PieC2: Piedmont-----	Bedrock (paralithic)	20-40	None	High	Low
PIT. Pits					
PukA, Pula: Pulaski-----	---	---	None	Low	Moderate

## Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top In		Uncoated steel	Concrete
RenB, RenC, RewC2: Renfrow-----	Bedrock (paralithic)	60-96	None	High	Low
RinB, RnnC2: Renthin-----	Bedrock (paralithic)	40-60	None	High	Low
SDGD4: Stephenville-----	Bedrock (paralithic)	20-40	None	Moderate	Moderate
Darsil-----	Bedrock (paralithic)	10-20	None	Low	Moderate
Gullied land.					
SDND, SDND2: Stephenville-----	Bedrock (paralithic)	20-40	None	Moderate	Moderate
Darsil-----	Bedrock (paralithic)	10-20	None	Low	Moderate
Newalla-----	Bedrock (paralithic)	40-60	None	High	Moderate
SlaB, SlaD, SlaF: Slaughterville-----	---	---	None	Low	Low
StDC, StDC2, StDE: Stephenville-----	Bedrock (paralithic)	20-40	None	Moderate	Moderate
Darsil-----	Bedrock (paralithic)	10-20	None	Low	Moderate
SteB, SteC2: Stephenville-----	Bedrock (paralithic)	20-40	None	Moderate	Moderate
SUND: Stephenville-----	Bedrock (paralithic)	20-40	None	Moderate	Moderate
Urban land.					
Newalla-----	Bedrock (paralithic)	40-60	None	High	Moderate
TelB, TelC2: Teller-----	---	---	None	Low	Moderate
TriA: Tribbey-----	---	---	None	High	Low
URB. Urban land					



## Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top <u>In</u>		Uncoated steel	Concrete
W. Water					
YaaA, YahA: Yahola-----	---	---	None	Low	Low
ZaHC: Zaneis-----	Bedrock (paralithic)	40-60	None	Moderate	Low
Huska-----	Bedrock (paralithic)	40-60	None	High	Moderate
ZanB, ZanC, ZanC2: Zaneis-----	Bedrock (paralithic)	40-60	None	Moderate	Low

# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (9, 10). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table "Classification of the Soils" lists each soil series in the survey area and gives its classification. The categories are defined in the following paragraphs.

**ORDER.** Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning dry, plus *oll*, from Mollisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning argillic horizonation, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Udic Argiustolls.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Udic Argiustolls.

**SERIES.** The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Classification of the Soils

Soil name	Family or higher taxonomic class
Ashport-----	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Bathel-----	Fine-loamy, mixed, superactive, thermic Aquic Hapludalfs
Bethany-----	Fine, mixed, superactive, thermic Pachic Paleustolls
Bocox-----	Loamy, mixed, active, thermic Aquic Arenic Hapludalfs
Canadian-----	Coarse-loamy, mixed, superactive, thermic Udic Haplustolls
Coyle-----	Fine-loamy, siliceous, active, thermic Udic Argiustolls
Darsil-----	Thermic, shallow and coated Ustic Quartzipsamments
Derby-----	Mixed, thermic Lamellic Ustipsamments
Dougherty-----	Loamy, mixed, active, thermic Arenic Haplustalfs
Easpur-----	Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls
Gaddy-----	Sandy, mixed, thermic Udic Ustifluvents
Goodnight-----	Mixed, thermic Typic Ustipsamments
Gracemore-----	Sandy, mixed, thermic Oxyaquic Udifluvents
Grainola-----	Fine, mixed, active, thermic Udertic Haplustalfs
Grant-----	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Harrah-----	Fine-loamy, siliceous, active, thermic Ultic Paleustalfs
Hawley-----	Coarse-loamy, mixed, active, thermic Fluventic Haplustepts
Huska-----	Fine, mixed, superactive, thermic Mollic Natrustalfs
Ironmound-----	Loamy, mixed, active, thermic, shallow Udic Haplustepts
Kingfisher-----	Fine-silty, mixed, active, thermic Udic Argiustolls
Kirkland-----	Fine, mixed, superactive, thermic Udertic Paleustolls
Konawa-----	Fine-loamy, mixed, active, thermic Ultic Haplustalfs
Lawrie-----	Fine-silty, mixed, superactive, thermic Pachic Argiustolls
Lebron-----	Clayey over sandy or sandy-skeletal, mixed, superactive, thermic Fluvaquentic Hapludolls
Littleaxe-----	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Lucien-----	Loamy, mixed, superactive, thermic, shallow Udic Haplustolls
Masham-----	Clayey, mixed, active, thermic, shallow Udic Haplustepts
Miller-----	Fine, mixed, superactive, thermic Udertic Haplustolls
Minco-----	Coarse-silty, mixed, superactive, thermic Udic Haplustolls
Mulhall-----	Fine-loamy, siliceous, active, thermic Udic Paleustolls
Navina-----	Fine-loamy, mixed, active, thermic Udic Argiustolls
Newalla-----	Fine-loamy over clayey, siliceous, superactive, thermic Udic Haplustalfs
Norge-----	Fine-silty, mixed, active, thermic Udic Paleustolls
Piedmont-----	Fine, mixed, superactive, thermic Udertic Argiustolls
Pulaski-----	Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents
Renfrow-----	Fine, mixed, superactive, thermic Udertic Paleustolls
Renthin-----	Fine, mixed, superactive, thermic Udertic Argiustolls
Slaughterville-----	Coarse-loamy, mixed, superactive, thermic Udic Haplustolls
Stephenville-----	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Teller-----	Fine-loamy, mixed, active, thermic Udic Argiustolls
Tribbey-----	Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Udifluvents
Yahola-----	Coarse-loamy, mixed, superactive, calcareous, thermic Udic Ustifluvents
Zaneis-----	Fine-loamy, siliceous, active, thermic Udic Argiustolls

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each soil series. In addition, the physiographic region, province, and subprovince are specified for most of the series (5). A pedon, a small three-dimensional area of soil, which is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (12). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (10) and "Keys to Soil Taxonomy" (9). Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

### Ashport Series

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 65 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-silty, mixed, superactive, thermic Fluventic Haplustolls

#### Associated Soils

- Dale soils which have a mollic epipedon more than 20 inches thick; at the slightly higher elevations or on the higher flood plains that are rarely flooded
- Port soils which have a mollic epipedon more than 20 inches thick; on landscapes similar to those of the Ashport soils but commonly further from the stream channel
- Pulaski soils which have a coarse-loamy control section and do not have a mollic epipedon; on landscapes similar to those of the Ashport soils but generally nearer to the stream channel

#### Typical Pedon

Ashport silty clay loam; Payne County, Oklahoma; in a cultivated area, about 1/2 mile west of Stillwater, 2,440 feet east and 920 feet north of the southwest corner of sec. 16, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure; hard, firm; many fine roots; slightly acid; abrupt smooth boundary. (0 to 8 inches thick)

A—5 to 16 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; many fine roots; neutral; clear smooth boundary. (0 to 16 inches thick)

- Bw—16 to 36 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, firm; few fine roots; slightly acid; clear smooth boundary. (14 to 54 inches thick)
- Ab—36 to 52 inches; dark reddish gray (5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; weak coarse prismatic structure parting to weak medium granular; slightly hard, friable; slightly acid; gradual smooth boundary. (0 to 20 inches thick)
- Bwb—52 to 66 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; slightly acid; gradual smooth boundary. (0 to 27 inches thick)
- BCb—66 to 80 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, friable; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* Less than 20 inches

*Thickness of the solum:* 26 to more than 60 inches

*Depth to carbonates:* 20 to 60 inches

*Depth to bedrock:* More than 80 inches

*Depth to buried horizon:* 24 to more than 60 inches

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam, loam, clay loam, or silty clay loam

Reaction—moderately acid to moderately alkaline

Roots—many, fine

Clay content—15 to 35 percent

Thickness—10 to 16 inches

#### *Bw horizon:*

Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 to 6

Texture—silty clay loam, clay loam, loam, or silt loam

Reaction—slightly acid to moderately alkaline

Roots—few, fine

Clay content—18 to 35 percent

Thickness—14 to 54 inches

#### *C horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6

Texture—loam, silt loam, silty clay loam, or clay loam that is stratified with coarser or finer materials

Reaction—slightly alkaline or moderately alkaline

Clay content—18 to 35 percent

Thickness—0 to 24 inches

#### *Ab horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam, silt loam, clay loam, or silty clay loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

Thickness—0 to 20 inches

#### *Bwb horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6

Texture—loam, silt loam, or silty clay loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

Thickness—0 to 27 inches

*BCb horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6

Texture—loam, silt loam, or silty clay loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

## ***Bathel Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material and geologic age:* Loamy alluvium or eolian sediments of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Primary landscape:* Upland

*Secondary landscape:* Terrace

*Landform:* Dune

*Landform position:* Interdune

*Slope range:* 0 to 3 percent

*Slope shape:* Concave-linear to linear-linear

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 220

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, mixed, superactive, thermic Aquic Hapludalfs

### **Associated Soils**

- Bocox soils which have sandy textures more than 20 inches thick; in the slightly lower areas
- Derby soils which are on dunes
- Dougherty and Konawa soils which are in the slightly higher positions
- Navina soils which have a mollic epipedon; in the slightly higher positions

### **Typical Pedon**

Bathel loamy fine sand, 0 to 1 percent slopes (fig. 17); Logan County, Oklahoma; in cropland, 4.0 miles west and 0.60 mile north of Crescent, 1,800 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 17 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable; many very fine and few fine roots; few fine pores; common strong brown (7.5YR 5/6) rhizospheres; moderately acid; clear smooth boundary. (0 to 12 inches thick)

A—8 to 12 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; soft, very friable; many very fine and few fine roots; few fine pores; common strong brown (7.5YR 5/6) rhizospheres; slightly acid; clear smooth boundary. (8 to 12 inches thick)

E—12 to 18 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish



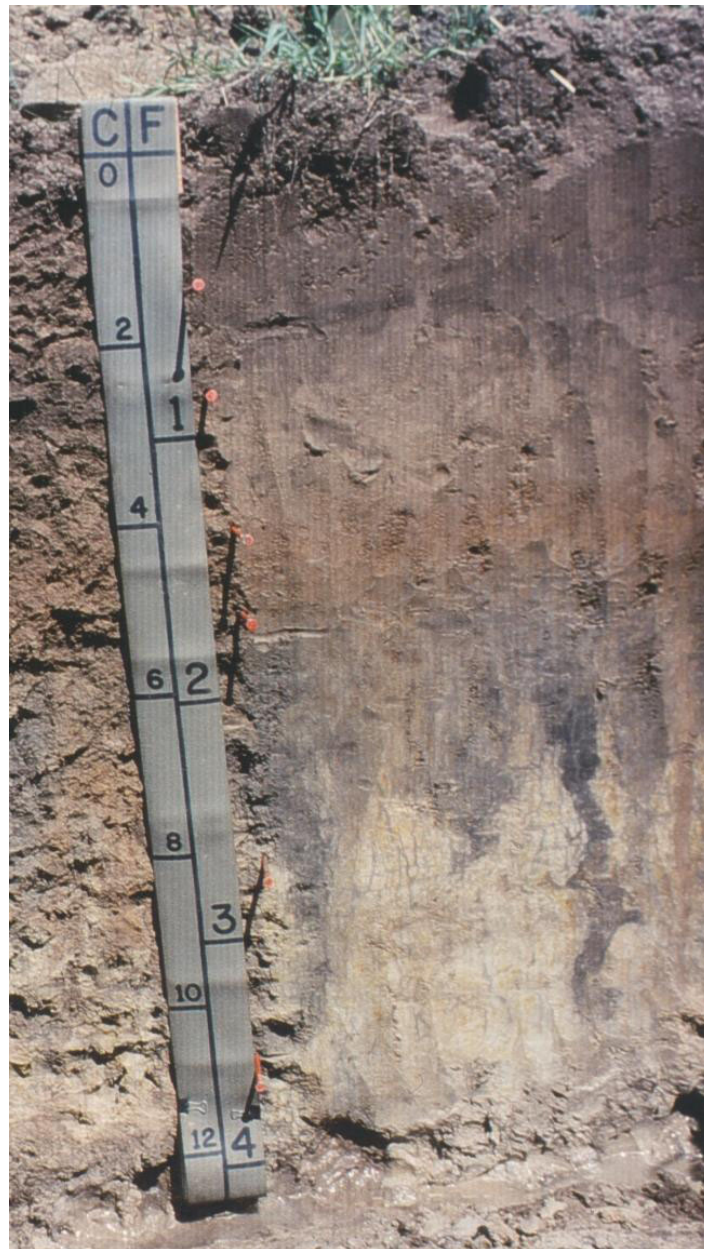


Figure 17.—Profile of Bathel loamy fine sand, 0 to 1 percent slopes. Multiply the scale on the left by 10 for centimeters.

brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; soft, very friable; many very fine roots; few fine pores; common medium faint very dark grayish brown (10YR 3/2) redoximorphic depletions; common strong brown (7.5YR 5/6) rhizospheres; neutral; clear wavy boundary. (3 to 12 inches thick)

Bt—18 to 22 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; strong medium and coarse prismatic structure parting to strong medium blocky; very hard, very firm; common discontinuous clay films on faces of peds; many very fine roots; common fine pores; common medium faint dark grayish brown (10YR 4/2, moist) and common medium prominent strong brown (7.5YR 4/6, moist)

- redoximorphic depletions and concentrations; common strong brown (7.5YR 5/6) rhizospheres; slightly alkaline; clear wavy boundary. (5 to 17 inches thick)
- Btg1—22 to 34 inches; gray (10YR 5/1) sandy clay, very dark gray (10YR 3/1) moist; moderate medium and coarse prismatic structure parting to moderate medium blocky; very hard, very firm; common continuous distinct clay films on faces of peds; many very fine roots; few fine pores; common fine distinct dark yellowish brown (10YR 4/4, moist) and common fine prominent yellowish brown (10YR 5/6, moist) redoximorphic concentrations and depletions; slightly alkaline; clear irregular boundary. (10 to 22 inches thick)
- Btg2—34 to 45 inches; gray (10YR 5/1) [very dark gray (10YR 3/1) moist], light gray (10YR 6/1) [gray (10YR 5/1) moist], and brownish yellow (10YR 6/6) [yellowish brown (10YR 5/6) moist] sandy clay loam; this material is a mixture of redoximorphic concentrations and depletions; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm; common continuous distinct clay films on faces of peds; few very fine roots; few fine pores; neutral; clear irregular boundary. (7 to 16 inches thick)
- BCtg—45 to 53 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; hard, friable; few discontinuous faint clay bridging of sands; few very fine roots; few fine pores; common coarse prominent light yellowish brown (10YR 6/4, moist), common coarse distinct dark yellowish brown (10YR 4/4, moist), and common fine distinct brown (7.5YR 4/2, moist) redoximorphic concentrations and depletions; neutral; gradual wavy boundary. (0 to 25 inches thick)
- BCg—53 to 66 inches; light brown (7.5YR 6/3) [brown (7.5YR 5/3) moist], reddish yellow (7.5YR 6/6) [strong brown (7.5YR 5/6) moist], and light gray (10YR 7/2) [light brownish gray (10YR 6/2) moist] sandy loam; this material is a mixture of redoximorphic concentrations and depletions; weak coarse subangular blocky structure; slightly hard, very friable; few very fine roots; few fine pores; neutral; gradual wavy boundary. (0 to 29 inches thick)
- Btb—66 to 86 inches; pink (7.5YR 7/3) sandy loam, light brown (7.5YR 6/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; common discontinuous clay films on faces of peds; few very fine roots; few fine pores; many coarse prominent strong brown (7.5YR 4/6, moist) redoximorphic concentrations; slightly alkaline.

### Range in Characteristics

*Thickness of the solum:* More than 50 inches

*Depth to carbonates:* More than 60 inches

*Depth to redoximorphic depletions and concentrations:* 12 to 28 inches

#### *Ap or A horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—loamy sand, loamy fine sand, or fine sandy loam

Reaction—very strongly acid to neutral

Clay content—2 to 18 percent

#### *E horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4

Texture—loamy fine sand or fine sandy loam

Reaction—strongly acid to neutral

Clay content—2 to 18 percent

Redoximorphic features—brown concentrations

#### *Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6



Texture—sandy clay loam  
 Reaction—neutral to moderately alkaline  
 Clay content—20 to 35 percent  
 Redoximorphic features—brown or gray concentrations and depletions

*Btg1 horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4  
 Texture—sandy clay loam or sandy clay  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—20 to 45 percent  
 Redoximorphic features—brown or gray concentrations and depletions

*Btg2 or Btg3 horizon (if it occurs):*

Color—hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 0 to 2  
 Texture of Btg2 horizon—sandy clay loam  
 Texture of Btg3 horizon—fine sandy loam or sandy clay loam  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—18 to 35 percent  
 Redoximorphic features—brown or gray concentrations and depletions

*BCg and BCtg horizons:*

Color—hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 or 2  
 Texture—fine sandy loam, sandy loam, or loamy fine sand  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—2 to 18 percent  
 Redoximorphic features—brown or gray concentrations and depletions

*Btb' horizon (if it occurs):*

Color—hue of 2.5YR to 10YR, value of 5 to 8, and chroma of 1 to 3  
 Texture—sandy clay loam  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—20 to 35 percent  
 Redoximorphic features—brown concentrations

## ***Bethany Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Alluvium or loess of Pleistocene age over shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Tread

*Slope range:* 0 to 5 percent

*Slope shape:* Linear-linear

*Elevation range:* 950 to 1,250 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 57 to 64 degrees F

*Frost-free days:* 190 to 220

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Pachic Paleustolls

### Associated Soils

- Norge soils which have a mollic epipedon less than 20 inches thick and have less than 35 percent clay in the control section; on landscapes similar to those of the Bethany soils
- Pond Creek soils which have less than 35 percent clay in the control section; on landscapes similar to those of the Bethany soils
- Kirkland soils which have an abrupt textural change from the A horizon to the Bt horizon and have COLE value of 0.07 or more; on landscapes similar to those of the Bethany soils
- Renfrow soils which have a mollic epipedon less than 20 inches thick and have COLE value of 0.07 or more; on landscapes similar to those of the Bethany soils
- Vanoss soils which have a mollic epipedon less than 20 inches thick and have less than 35 percent clay in the control section; on landscapes similar to those of the Bethany soils
- Tabler soils which have COLE value of 0.07 or more, redoximorphic accumulations and depletions in the Bt horizon, and smectitic mineralogy; on the same landscape as the Bethany soils but in the slightly lower positions

### Typical Pedon

Bethany silt loam; Oklahoma County, Oklahoma; in a cultivated area, about 1 mile east of Wheatland, 1,000 feet north and 200 feet east of the southwest corner of sec. 28, T. 11 N., R. 4 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; many fine roots; slightly acid; clear smooth boundary. (0 to 10 inches thick)
- A—6 to 14 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable; many fine roots; slightly acid; gradual smooth boundary. (6 to 20 inches thick)
- BA—14 to 18 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm; many fine roots; neutral; clear smooth boundary. (3 to 10 inches thick)
- Bt1—18 to 36 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; strong fine and medium blocky structure; very hard, very firm; clay films on faces of peds; common fine roots; slightly alkaline; gradual smooth boundary. (10 to 25 inches thick)
- Bt2—36 to 56 inches; brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; moderate medium and coarse blocky structure; very hard, very firm; clay films on faces of peds; few fine roots; common fine iron-manganese concretions; few fine concretions of calcium carbonate; moderately alkaline; gradual smooth boundary. (10 to 30 inches thick)
- Bt3—56 to 72 inches; brown (7.5YR 5/4) silty clay, brown (7.5YR 4/4) moist; moderate medium and coarse blocky structure; very hard, very firm; patchy clay films on faces of peds; few fine roots; common fine and coarse distinct yellowish red (5YR 5/6) and reddish brown (5YR 5/4) redoximorphic features; common fine iron-manganese concretions; few soft accumulations of secondary lime; few fine concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (10 to 20 inches thick)
- Bt4—72 to 80 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak medium blocky structure; very hard, very firm; patchy clay films on faces of peds; common coarse distinct brown (7.5YR 5/4) and red (2.5YR 5/6) redoximorphic features; few fine concretions of calcium carbonate; calcareous; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* More than 20 inches

*Thickness of the solum:* More than 60 inches

*Depth to bedrock:* More than 80 inches

*Depth to carbonates:* 28 to 40 inches

*A horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3

Texture—silt loam or silty clay loam

Reaction—strongly acid to slightly alkaline

Electrical conductivity of the saturation extract—0 to 1 mmho/cm

Roots—many, fine

Clay content—15 to 35 percent

Thickness—8 to 20 inches

*BA horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3

Texture—silty clay loam or clay loam

Reaction—slightly acid to slightly alkaline

Electrical conductivity of the saturation extract—0 to 1 mmho/cm

Roots—many, fine

Clay content—27 to 35 percent

Thickness—3 to 10 inches

*Bt1 horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—neutral to moderately alkaline

Electrical conductivity of the saturation extract—0 to 1 mmho/cm

Roots—common, fine

Clay content—35 to 50 percent

Thickness—10 to 25 inches

*Bt2 horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—neutral to moderately alkaline

Electrical conductivity of the saturation extract—0 to 4 mmhos/cm

Sodium adsorption ratio—0 to 8

Roots—few, fine

Redoximorphic features—few or common accumulations in shades of brown

Clay content—35 to 50 percent

Thickness—10 to 30 inches

*Bt3 horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—neutral to moderately alkaline

Electrical conductivity of the saturation extract—0 to 4 mmhos/cm

Clay content—35 to 50 percent

Redoximorphic features—accumulations and depletions in shades of yellow, red, gray, or brown

Sodium adsorption ratio—0 to 8

Roots—many, fine

Thickness—10 to 20 inches

*Bt4 horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—neutral to moderately alkaline

Clay content—35 to 50 percent

Redoximorphic features—accumulations and depletions in shades of yellow, red, gray, or brown

***Bocox Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Parent material and geologic age:* Loamy alluvium or aeolian sediments of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Primary landscape:* Upland

*Secondary landscape:* Terrace

*Landform:* Dunefield

*Landform position:* Interdunal depression

*Slope range:* 0 to 3 percent

*Slope shape:* Concave-concave

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 220

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Loamy, mixed, active, thermic Aquic Arenic Hapludalfs

**Associated Soils**

- Bathel soils which have sandy surface layers less than 20 inches thick; in positions similar to those of the Bocox soils
- Navina soils which do not have wetness features within a depth of 30 inches and have a mollic epipedon; in the slightly higher areas
- Dougherty and Konawa soils which do not have wetness features within a depth of 30 inches; in the slightly higher areas
- Derby soils which do not have wetness features within a depth of 30 inches; on dunes

**Typical Pedon**

Bocox loamy fine sand, 0 to 1 percent slopes; Logan County, Oklahoma; in rangeland, 3.35 miles west and 0.75 mile north of Crescent, 500 feet west and 1,900 feet south of the northeast corner of sec. 7, T. 17 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

- A—0 to 11 inches; yellowish brown (10YR 5/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; few medium faint very dark grayish brown (10YR 3/2) redoximorphic depletions; moderate medium granular structure; soft, very friable; common very fine and few fine and medium roots; few fine pores; common brown (7.5YR 5/4) rhizospheres; neutral; clear smooth boundary. (4 to 12 inches thick)
- E1—11 to 20 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak medium granular structure; soft, very friable;

- common very fine and few fine and medium roots; few fine pores; common strong brown (7.5YR 4/6) rhizospheres; water table at a depth of 16 inches; slightly alkaline; gradual smooth boundary. (5 to 25 inches thick)
- E2—20 to 33 inches; yellowish brown (10YR 5/6) loamy fine sand, dark yellowish brown (10YR 4/6) moist; weak medium granular structure; soft, very friable; common very fine and few fine and medium roots; few fine pores; slightly alkaline; clear smooth boundary. (0 to 17 inches thick)
- Bt1—33 to 52 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; very hard, very firm; few fine black concretions; few very fine roots; few fine pores; common medium and coarse distinct strong brown (7.5YR 5/8, moist) masses of iron accumulation; few medium prominent very dark grayish brown (10YR 3/2, moist) masses of iron depletion; slightly alkaline; gradual smooth boundary. (6 to 34 inches thick)
- Bt2—52 to 65 inches; fine sandy loam that is variegated in reddish yellow (7.5YR 6/6) [strong brown (7.5YR 5/6) moist], pink (7.5YR 7/4) [light brown (7.5YR 6/4) moist], pink (7.5YR 7/3) [light brown (7.5YR 6/3) moist], pinkish gray (5YR 7/2) [pinkish gray (5YR 6/2) moist], and white (5YR 8/1) [light gray (5YR 7/1) moist]; gray areas are masses of iron depletion; moderate medium subangular blocky structure; hard, firm; few very fine roots; few fine pores; slightly alkaline; gradual smooth boundary. (4 to 20 inches thick)
- Bt3—65 to 80 inches; fine sandy loam that is variegated in reddish yellow (7.5YR 6/6) [strong brown (7.5YR 5/6) moist], pink (7.5YR 7/4) [light brown (7.5YR 6/4) moist], pink (7.5YR 7/3) [light brown (7.5YR 6/3) moist], pinkish gray (5YR 7/2) [pinkish gray (5YR 6/2) moist], and white (5YR 8/1) [light gray (5YR 7/1) moist]; gray areas are masses of iron depletion; moderate medium subangular blocky structure; hard, firm; few very fine roots; few fine pores; slightly alkaline.

### Range in Characteristics

*Thickness of the solum:* More than 60 inches

*Combined thickness of the A and E horizons:* 20 to 40 inches

*Water table:* 12 inches above the surface and extending to a depth of 18 inches

#### *A horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 to 4

Texture—loamy fine sand or fine sandy loam

Reaction—slightly acid to slightly alkaline

Clay content—2 to 18 percent

Redoximorphic features—brown concentrations

#### *E horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6

Texture—loamy fine sand

Reaction—neutral or slightly alkaline

Clay content—2 to 10 percent

Redoximorphic features—brown concentrations

#### *Bt1 horizon:*

Color—hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 6

Texture—fine sandy loam or sandy clay loam

Reaction—neutral or slightly alkaline

Clay content—18 to 35 percent

Redoximorphic features—in shades of brown or gray

#### *Bt2 horizon:*

Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 1 to 6

Texture—fine sandy loam or sandy clay loam

Reaction—neutral or slightly alkaline

Clay content—15 to 35 percent

Redoximorphic features—variegated and in shades of gray, yellow, or brown

***Bt3 horizon:***

Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 1 to 6

Texture—fine sandy loam or sandy clay loam

Reaction—neutral or slightly alkaline

Clay content—15 to 35 percent

Redoximorphic features—variegated and in shades of gray, yellow, or brown

## ***Canadian Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* High flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-loamy, mixed, superactive, thermic Udic Haplustolls

### **Associated Soils**

- Lela and McLain soils which have more than 35 percent clay in their control sections; adjacent to the Canadian soils on the same terrace
- Dale soils which have a mollic epipedon more than 20 inches thick and have more than 18 percent clay in the control sections; adjacent to the Canadian soils on the same terrace
- Port soils which have a mollic epipedon more than 20 inches thick and have more than 18 percent clay in the control section; in the lower positions on flood plains
- Crisfield soils which have hue of 5YR or redder in the control section; adjacent to Canadian soils on the same terrace
- Miller soils which have more than 35 percent clay in the control section; in the lower positions on flood plains
- Pulaski soils which do not have a mollic epipedon; in the lower positions on flood plains
- Yahola soils which do not have a mollic epipedon; in the lower positions on flood plains
- Lincoln soils which do not have a mollic epipedon and have a sandy control section; in the lower positions on flood plains
- Reinach soils which have a mollic epipedon more than 20 inches thick and have less than 18 percent clay and less than 15 percent material coarser than very fine sand in the control section; adjacent to the Canadian soils on the same terrace



### Typical Pedon

Canadian fine sandy loamy; Oklahoma County, Oklahoma; in a cultivated area, about 1/2 mile north of the intersection of Reno Avenue and Council Road in Oklahoma City, 2,600 feet north and 830 feet east of the southwest corner of sec. 32, T. 12 N., R. 4 W. (Colors are for dry soil unless otherwise stated.)

- A1—0 to 8 inches; dark grayish brown (10YR 4/2, crushed) fine sandy loam, very dark grayish brown (10YR 3/2, crushed) moist; weak medium platy structure parting to weak fine granular; slightly hard, very friable; many very fine and fine roots; many very fine pores; noneffervescent; neutral; clear smooth boundary. (0 to 10 inches thick)
- A2—8 to 18 inches; dark grayish brown (10YR 4/2, crushed) fine sandy loam, very dark grayish brown (10YR 3/2, crushed) moist; weak medium granular structure; slightly hard, very friable; many very fine and fine roots; many very fine pores; noneffervescent; slightly alkaline; clear smooth boundary. (8 to 20 inches thick)
- Bw—18 to 28 inches; brown (7.5YR 5/2, crushed) fine sandy loam, brown (7.5YR 4/2, crushed) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, very friable; common very fine and fine roots; many very fine pores; noneffervescent; slightly alkaline; gradual wavy boundary. (10 to 35 inches thick)
- C1—28 to 43 inches; strong brown (7.5YR 5/6, crushed) fine sandy loam, strong brown (7.5YR 4/6, crushed) moist; massive; slightly hard, very friable; common very fine and few fine roots; noneffervescent; slightly alkaline; gradual wavy boundary. (12 to 20 inches thick)
- C2—43 to 52 inches; yellowish red (5YR 5/6, crushed) fine sandy loam, yellowish red (5YR 4/6, crushed) moist; massive; slightly hard, very friable; common very fine and few fine roots; noneffervescent; slightly alkaline; gradual smooth boundary. (0 to 20 inches thick)
- C3—52 to 84 inches; reddish yellow (5YR 6/6, crushed) loamy fine sand, yellowish red (5YR 5/6, crushed) moist; single grained; soft, very friable; few very fine and few fine roots; stratified with thin layers of red (2.5YR 4/6, moist) material; noneffervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 20 inches

*Thickness of the solum:* 20 to 50 inches

*Depth to bedrock:* More than 80 inches

#### *A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3

Texture—fine sandy loam, sandy loam, very fine sandy loam, or loam

Reaction—very strongly acid to slightly alkaline

Clay content—5 to 18 percent

Thickness—combined thickness of the A horizon ranges from 7 to 20 inches

#### *Bw horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6

Texture—fine sandy loam, sandy loam, or loam

Reaction—slightly acid to moderately alkaline

Clay content—10 to 18 percent

Thickness—10 to 35 inches

#### *C1 horizon:*

Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6

Texture—typically fine sandy loam, sandy loam, or loam; range includes loamy fine sand and fine sand in some pedons below a depth of 40 inches

Reaction—slightly acid to moderately alkaline  
 Clay content—5 to 18 percent  
 Thickness—12 to 20 inches

*C2 and C3 horizons:*

Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 3 to 6  
 Texture—typically fine sandy loam, sandy loam, loam, or loamy fine sand; range includes fine sand in some pedons below a depth of 40 inches  
 Reaction—slightly acid to moderately alkaline  
 Clay content—5 to 18 percent

## **Coyle Series**

*Major land resource area:* Central Rolling Red Prairies (80A)  
*Depth class:* Moderately deep  
*Drainage class:* Well drained  
*Parent material and geologic age:* Material weathered from sandstone of Permian age  
*Physiographic region:* Interior Lowlands  
*Physiographic province:* Central Lowland  
*Physiographic sub-province:* Osage Plain  
*Landscape:* Upland  
*Landform:* Hills  
*Landform position:* Summit and backslope  
*Slope range:* 1 to 12 percent  
*Slope shape:* Convex-convex  
*Elevation range:* 700 to 1,500 feet  
*Mean annual precipitation:* 26 to 40 inches  
*Mean annual air temperature:* 58 to 64 degrees F  
*Frost-free days:* 190 to 230  
*Thorntwaite PE index:* 44 to 64  
*Taxonomic class:* Fine-loamy, siliceous, active, thermic Udic Argiustolls

### **Associated Soils**

- Chickasha and Zaneis soils which have a solum more than 40 inches thick; commonly on side slopes below the Coyle soils
- Grainola and Renfrow soils which have a fine control section; commonly on convex side slopes below the Coyle soils
- Lucien soils which have a solum less than 20 inches thick over sandstone and do not have Bt horizons; on landscapes similar to those of the Coyle soils

### **Typical Pedon**

Coyle loam (fig. 18); Payne County, Oklahoma; in rangeland, about 6 miles south and 3 miles west of Stillwater, 70 feet north and 460 feet west of the southeast corner of sec. 17, T. 18 N., R. 2 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 11 inches; dark reddish gray (5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; strong fine granular structure; slightly hard, friable; many fine roots; slightly alkaline; clear smooth boundary. (6 to 14 inches thick)
- BA—11 to 14 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, friable; many fine roots; many fine pores; many wormcasts; slightly alkaline; clear smooth boundary. (0 to 8 inches thick)
- Bt1—14 to 31 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; moderate



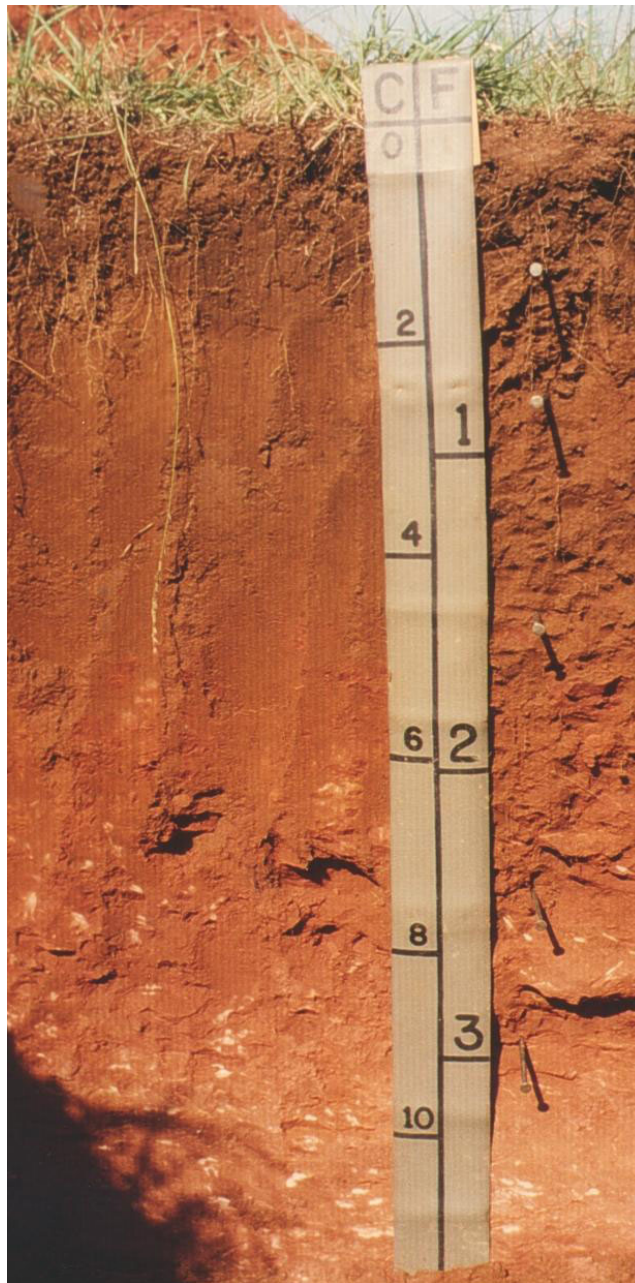


Figure 18.—Profile of Coyle loam. Multiply scale on the left by 10 for centimeters.

medium subangular blocky structure; hard, firm; common fine roots; thin nearly continuous clay films on faces of peds; neutral; gradual smooth boundary. (7 to 19 inches thick)

Bt2—31 to 39 inches; light red (2.5YR 6/8) sandy clay loam, red (2.5YR 5/8) moist; weak coarse subangular blocky structure; hard, firm; common fine roots; few coarse fragments of sandstone less than 76 mm in diameter; patchy clay films on faces of peds; neutral; abrupt smooth boundary. (0 to 16 inches thick)

Cr—39 to 42 inches; red (2.5YR 5/6) sandstone; can be augered when moist.

**Range in Characteristics**

*Thickness of the mollic epipedon:* 7 to 20 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

*A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—fine sandy loam or loam

Reaction—moderately acid to slightly alkaline

Roots—many, fine

Clay content—10 to 26 percent

Thickness—6 to 14 inches

*BA horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam or fine sandy loam

Reaction—moderately acid to slightly alkaline

Roots—many, fine

Pores—many, fine

Clay content—18 to 26 percent

Thickness—0 to 8 inches

*Bt1 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—clay loam, loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

Roots—common, fine

Clay content—20 to 35 percent

Redoximorphic features—red or brown concentrations

Content and size of coarse fragments—0 to 10 percent, by volume; less than 76 mm in diameter

Thickness—7 to 19 inches

*Bt2 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—clay loam, fine sandy loam, loam, or sandy clay loam or their channery, flaggy, or gravelly counterparts

Reaction—moderately acid to slightly alkaline

Roots—common, fine

Clay content—18 to 35 percent

Redoximorphic features—yellow, red, or brown concentrations

Content and size of coarse fragments—0 to 35 percent, by volume, sandstone fragments (about 0 to 30 percent are less than 76 mm in diameter and 0 to 30 percent are more than 76 mm in diameter)

Thickness—0 to 16 inches

*Bt3 horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—clay loam, fine sandy loam, loam, or sandy clay loam or their channery, flaggy, or gravelly counterparts

Reaction—moderately acid to slightly alkaline

Roots—common, fine

Clay content—18 to 35 percent

Redoximorphic features—yellow, red, or brown concentrations

Content and size of coarse fragments—0 to 35 percent, by volume, sandstone

fragments (about 0 to 30 percent are less than 76 mm in diameter and 0 to 30 percent are more than 76 mm in diameter)

Thickness—0 to 10 inches

*BC horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—clay loam, loam, fine sandy loam, or very fine sandy loam or their gravelly, channery, or flaggy counterparts

Reaction—moderately acid to slightly alkaline

Clay content—18 to 35 percent

Redoximorphic features—yellow, red, or brown concentrations

Content and size of coarse fragments—0 to 35 percent, by volume, sandstone fragments (about 0 to 30 percent are less than 76 mm in diameter and 0 to 30 percent are more than 76 mm in diameter)

Thickness—0 to 16 inches

*Cr horizon:*

Color—hue of 2.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8

Texture—weathered sandstone bedrock

## ***Darsil Series***

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Shallow

*Drainage class:* Excessively drained

*Parent material and geologic age:* Weakly cemented sandstone of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Shoulder

*Slope range:* 1 to 45 percent

*Slope shape:* Convex-linear or convex-convex

*Elevation range:* 750 to 1,200 feet

*Mean annual precipitation:* 30 to 38 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Thermic, shallow and coated Ustic Quartzipsamments

### **Associated Soils**

- Darnell soils which have a loamy textural control section; on the same landscape as the Darsil soils
- Harrah soils which have a fine-loamy control section, have an argillic horizon, and have a solum more than 60 inches thick; on footslopes
- Littleaxe soils which have a fine-loamy control section, an argillic horizon, and a solum that is 40 to 60 inches thick
- Newalla soils which have a fine control section, an argillic horizon, and a solum that is 35 to 60 inches thick
- Stephenville soils which have a fine-loamy control section, an argillic horizon, and a solum that is 20 to 40 inches thick

### **Typical Pedon**

Darsil loamy fine sand (when described the soil was moist throughout); Cleveland

County, Oklahoma; on a 4 percent convex west-facing slope, in a post oak-blackjack oak forest with an understory of native grasses, about 6 miles east of the intersection of U.S. Highway 77 and Alameda Street in Norman, 700 feet east and 50 feet south of the northwest corner of sec. 32, T. 9 N., R 1 W. (Colors are for dry soil unless otherwise stated.)

- A—0 to 5 inches; brown (7.5YR 5/2) loamy fine sand, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary. (3 to 9 inches thick)
- EC—5 to 17 inches; pink (7.5YR 7/4) fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; 2 percent, by volume, coarse fragments 2 to 76 mm in diameter; neutral; clear wavy boundary. (6 to 15 inches thick)
- Cr—17 to 23 inches; red (2.5YR 5/8) weakly cemented fine-grained sandstone, red (2.5YR 4/8) moist; moderately acid.

#### Range in Characteristics

*Thickness of the solum:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches

*Reaction:* Strongly acid to slightly alkaline throughout the profile

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—loamy fine sand

Reaction—strongly acid to slightly alkaline

Clay content—1 to 10 percent

Thickness—3 to 9 inches

#### *EC horizon:*

Color—hue of 2.5YR to 10YR, value of 6 or 7, and chroma of 3 to 6

Texture—loamy fine sand or fine sand

Reaction—strongly acid to slightly alkaline

Clay content—1 to 10 percent

Content and size of coarse fragments—0 to 20 percent, by volume, sandstone fragments 2 to 76 mm in diameter

Thickness—6 to 15 inches

#### *Cr horizon:*

Color—hue of 2.5YR or 5YR, value of 3 to 6, and chroma of 4 to 8

Texture—weathered, weakly cemented fine-grained sandstone

### ***Derby Series***

*Major land resource area:* Northern Cross Timbers (84A) and Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Parent material and geologic age:* Sandy eolian sediments of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Primary landform:* Dunefield

*Secondary landform:* Dune

*Slope range:* 0 to 35 percent

*Slope shape:* Convex-convex

*Elevation range:* 800 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Mixed, thermic Lamellic Ustipsamments

### **Associated Soils**

- Amber soils which have a coarse-silty control section; on flood plains
- Gaddy soils which are stratified and have an irregular decrease in organic matter content with increasing depth; on flood plains
- Goodnight soils which do not have lamellae
- Minco soils which have a mollic epipedon and a coarse-silty control section; on landscapes similar to those of the Derby soils
- Paluxy soils which have a coarse-loamy control section; on landscapes similar to those of the Derby soils
- Yahola soils which have a coarse-loamy control section and an irregular decrease in organic matter content with increasing depth; on flood plains

### **Typical Pedon**

Derby fine sandy loam; Payne County, Oklahoma; in a savannah, about 3 miles west and 3 miles south of Yale, 2,200 feet south and 200 feet west of the northeast corner of sec. 3, T. 18 N., R. 5 E. (Colors are for dry soil unless otherwise stated.)

A1—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (4 to 24 inches thick)

A2—9 to 20 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grained; loose; moderately acid; clear smooth boundary. (0 to 42 inches thick)

E1—20 to 54 inches; pink (7.5YR 7/4) fine sand, brown (7.5YR 5/4) moist; single grained; loose; slightly acid; diffuse smooth boundary. (16 to 48 inches thick)

E2 and Bt1—54 to 72 inches; reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6) moist (E2 part); single grained in E2 part; loose in E2 part; lamellae of yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6) moist (Bt1 part); massive in Bt1 part; soft, very friable in Bt1 part; lamellae are 2 to 15 cm apart and 2 to 10 mm thick and are discontinuous horizontally; neutral in E2 part and slightly acid in Bt1 part; diffuse smooth boundary. (18 to 36 inches thick)

E3 and Bt2—72 to 120 inches; pink (7.5YR 7/4) fine sand, light brown (7.5YR 6/4) moist (E3 part); single grained in E3 part; loose in E3 part; lamellae of yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist (Bt2 part); massive in Bt2 part; soft, very friable in Bt2 part; lamellae are 5 to 15 cm apart and 2 to 12 mm thick and are continuous horizontally; neutral.

### **Range in Characteristics**

*Thickness of the solum:* More than 60 inches

*Depth to bedrock:* More than 80 inches

*Depth to lamellae:* 44 to 60 inches

*Other features:* Where the surface layer is fine sandy loam, the total thickness of the Ap and/or A1 horizon is not more than 25 cm or the depth of the Ap horizon, whichever is deeper

*Ap or A1 horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—fine sandy loam or loamy fine sand

Reaction—moderately acid to slightly alkaline



Clay content—2 to 10 percent

Thickness—4 to 24 inches

*A2 horizon:*

Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 3 or 4

Texture—fine sand or loamy fine sand

Reaction—moderately acid to slightly alkaline

Clay content—1 to 10 percent

Thickness—0 to 42 inches

*E1 horizon:*

Color—hue of 5YR to 10YR, value of 6 or 7, and chroma of 4 to 8

Texture—fine sand or loamy fine sand

Reaction—moderately acid to slightly alkaline

Clay content—1 to 10 percent

Thickness—16 to 48 inches

*E2 and E3 parts of the E2 and Bt1 and E3 and Bt2 horizons:*

Color—hue of 5YR to 10YR, value of 6 to 8, and chroma of 4 to 8

Texture—loamy fine sand or fine sand

Reaction—moderately acid to moderately alkaline

Clay content—1 to 10 percent

*Bt1 and Bt2 parts of the E2 and Bt1 and E3 and Bt2 horizons:*

Color—hue of 2.5YR or 5YR, value of 4 to 7, and chroma of 4 to 8

Texture—typically loamy fine sand; range includes fine sand and fine sandy loam

Reaction—moderately acid to moderately alkaline

Clay content—1 to 10 percent

Thickness—lamellae range from 1 to 25 mm in thickness, but those more than 10 mm thick do not reach a cumulative total of 15 cm within a depth of 60 inches

Other features—lamellae are typically 2 to 20 cm apart

*C horizon (if it occurs):*

Color—hue of 7.5YR, value of 6 or 7, and chroma of 6 to 8

Texture—loamy fine sand or fine sand

Reaction—moderately acid to moderately alkaline

Clay content—1 to 10 percent

## ***Dougherty Series***

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Sandy and loamy sediments on terraces of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland terrace

*Primary landform:* Dunefield

*Secondary landform:* Dune and interdune

*Slope range:* 0 to 20 percent

*Slope shape:* Convex-convex or linear-convex

*Elevation range:* 800 to 1,300 feet

*Mean annual precipitation:* 30 to 38 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Loamy, mixed, active, thermic Arenic Haplustalfs

### **Associated Soils**

- Larton and Stidham soils which are on the higher terraces
- Bastrop soils which have an argillic horizon that does not decrease by more than 20 percent from the maximum within 60 inches from the surface; on the higher terraces
- Eufaula soils which are sandy; in the slightly higher positions
- Konawa and Teller soils which are in the slightly lower positions and on the more stable landscapes
- Derby and Slaughterville soils which are on recent eolian sediments

### **Typical Pedon**

Dougherty loamy fine sand; Payne County, Oklahoma; in a cultivated area, about 9 miles south and 8 miles west of Stillwater on State Highway 33, about 2,375 feet west and 50 feet south of the northeast corner of sec. 3, T. 17 N, R. 1 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary. (0 to 9 inches thick)

E—6 to 26 inches; very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; single grained; soft, very friable; moderately acid; clear smooth boundary. (13 to 36 inches thick)

Bt—26 to 42 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; very hard, friable; clay films on faces of peds and bridging sand grains; moderately acid; diffuse smooth boundary. (10 to 25 inches thick)

BC—42 to 54 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; moderately acid; diffuse smooth boundary. (10 to 30 inches thick)

C—54 to 70 inches; yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, friable; moderately acid.

### **Range in Characteristics**

*Thickness of the solum:* 45 to more than 72 inches

*Depth to bedrock:* More than 60 inches

*Thickness of the A and E horizons:* 20 to 40 inches

*Ap or A horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4

Texture—loamy fine sand or fine sand

Reaction—slightly acid to strongly acid

Clay content—2 to 10 percent

Thickness—0 to 9 inches

*E horizon:*

Color—hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 4

Texture—loamy fine sand or sand

Reaction—slightly acid to strongly acid

Clay content—2 to 10 percent

Thickness—13 to 36 inches

*Bt horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8

Texture—fine sandy loam or sandy clay loam

Reaction—slightly acid to strongly acid

Clay content—18 to 35 percent

Thickness—10 to 25 inches

*BC horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8

Texture—fine sandy loam, sandy clay loam, or loamy fine sand

Reaction—slightly acid to strongly acid

Clay content—12 to 25 percent

Thickness—10 to 30 inches

*C horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8

Texture—fine sandy loam or loamy fine sand

Reaction—neutral to strongly acid

Clay content—2 to 15 percent

## ***Easpur Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 1 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls

### **Associated Soils**

- Port soils which have a mollic epipedon more than 20 inches thick and have a fine-silty control section; on landscapes similar to those of the Easpur soils
- Dale soils which have a mollic epipedon more than 20 inches thick, have a fine-silty control section, and are rarely flooded; on the slightly higher landscapes
- Pulaski soils which have a coarse-loamy control section and do not have a mollic epipedon; typically closer to the stream channel than the Easpur soils

### **Typical Pedon**

Easpur loam; Payne County, Oklahoma; in a cultivated area, about 1/2 mile west of Stillwater, Oklahoma, 2,000 feet east and 1,300 feet north of the southwest corner of sec. 16, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 11 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; slightly hard, friable; many fine roots; slightly acid; clear smooth boundary. (8 to 14 inches thick)

Bw1—11 to 19 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR



- 4/4) moist; weak fine granular structure; soft, very friable; many fine roots; neutral; clear smooth boundary. (6 to 24 inches thick)
- Bw2—19 to 29 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; hard, firm; few fine roots; neutral; clear smooth boundary. (0 to 24 inches thick)
- C—29 to 41 inches; stratified reddish brown (5YR 5/4) loam, yellowish red (5YR 5/6) fine sandy loam, and reddish brown (5YR 4/3) clay loam; massive; slightly hard, friable; few fine roots; strata are 1 to 4 inches thick; slightly alkaline; clear smooth boundary. (0 to 33 inches thick)
- 2Ab—41 to 62 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; hard, firm; slightly alkaline; clear smooth boundary. (10 to 21 inches thick)
- 2Bwb—62 to 72 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, firm; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* Less than 20 inches

*Thickness of the solum:* 20 to more than 60 inches

*Depth to buried horizons:* 20 to more than 60 inches

*Depth to carbonates:* More than 50 inches in some pedons

*Depth to bedrock:* More than 80 inches

#### *Ap or A horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam or silt loam

Reaction—moderately acid to moderately alkaline

Roots—many, fine

Clay content—12 to 26 percent

Thickness—8 to 14 inches

#### *Bw horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—loam, clay loam, fine sandy loam, or very fine sandy loam

Reaction—slightly acid to moderately alkaline

Roots—few to many, fine

Clay content—18 to 35 percent

Thickness—6 to 48 inches

#### *C horizon:*

Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 3 to 6

Texture—stratified fine sandy loam to clay loam

Reaction—slightly acid to moderately alkaline

Roots—few, fine

Clay content—18 to 35 percent

Thickness—0 to 33 inches

#### *2Ab horizon:*

Color—hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3

Texture—silt loam, silty clay loam, clay loam, or loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

Thickness—10 to 21 inches

#### *2Bwb horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, silty clay loam, clay loam, or loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

## ***Gaddy Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Parent material and geologic age:* Recent sandy alluvium

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 57 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorndthwaite PE index:* 44 to 64

*Taxonomic class:* Sandy, mixed, thermic Udic Ustifluvents

### **Associated Soils**

- Gracemore soils which are in the lower areas nearest the stream channels
- Yahola soils which have textures finer than loamy fine sand in the textural control section; commonly in the higher areas

### **Typical Pedon**

Gaddy loamy fine sand; Pottawatomie County, Oklahoma; about 2 miles east and 1 mile south of Shawnee, about 2,100 feet west and 200 feet south of the northeast corner of sec. 28, T. 10 N., R. 4 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; calcareous; moderately alkaline; clear smooth boundary.

C1—8 to 20 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; soft; common thin strata of brown (7.5YR 4/4) fine sandy loam; calcareous; moderately alkaline; gradual smooth boundary.

C2—20 to 60 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; common thin strata of brown (10YR 5/3) loamy fine sand and fine sandy loam; calcareous; moderately alkaline.

### **Range in Characteristics**

*Depth to effervescence:* 0 to 10 inches

*A horizon:*

Color—hue of 5YR, 7.5YR, or 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 2 to 6; where the moist value and chroma are less than 3.5, the horizon is less than 10 inches thick or the organic matter content is less than 1 percent

Texture—fine sand to silt loam in the upper 10 inches; loamy fine sand or fine sand below a depth of 10 inches

Reaction—moderately alkaline or slightly alkaline; horizon is calcareous

*C horizon:*

Color—hue of 5YR, 7.5YR, or 10YR, value of 6 to 8 (5 to 7 moist), and chroma of 3 to 6

Texture—loamy fine sand or fine sand that is stratified with thin strata of fine sandy loam to clay loam

Reaction—moderately alkaline; horizon is calcareous

**Goodnight Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Excessively drained

*Parent material and geologic age:* Sandy eolian sediments of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Primary landscape:* Valley

*Secondary landscape:* Terrace

*Primary landform:* Dunefield

*Secondary landform:* Dune

*Slope range:* 0 to 45 percent

*Slope shape:* Convex-convex

*Elevation range:* 800 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Mixed, thermic Typic Ustipsamments

**Associated Soils**

- Derby soils which are at the higher elevations
- Gaddy soils which are on the lower flood plains adjacent to the Goodnight soils
- Amber and Reinach soils which are coarse-silty; on flood plains
- Gracemore soils which have thin strata of finer textures in the control section; on flood plains
- Miller soils which have a fine control section; on flood plains
- Yahola soils which have a coarse-loamy control section; on flood plains

**Typical Pedon**

Goodnight loamy fine sand; Payne County, Oklahoma; in rangeland, 5 miles north on Highway OK-18, about 1 mile east of Cushing, 600 feet south and 200 feet east of the northwest corner of sec. 11, T. 18 N., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 5 inches; brown (7.5YR 5/3) loamy fine sand, brown (7.5YR 4/3) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary. (4 to 14 inches thick)

AC1—5 to 16 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grained; loose; slightly acid; gradual wavy boundary. (0 to 28 inches thick)

AC2—16 to 40 inches; reddish yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; single grained; loose; neutral; clear smooth boundary. (0 to 36 inches thick)

C—40 to 80 inches; reddish yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6)

moist; single grained; loose; bedding strata and some cross-bedding; calcareous; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the solum:* 10 to 60 inches

*Depth to bedrock:* More than 80 inches

*Depth to carbonates:* 0 to 40 inches

*A horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—loamy fine sand or fine sand

Reaction—slightly acid to moderately alkaline

Clay content—2 to 12 percent

*AC1 horizon:*

Color—hue of 5YR or 10YR, value of 5 to 7, and chroma of 3 to 6

Texture—loamy fine sand or fine sand

Reaction—slightly acid to moderately alkaline

Clay content—2 to 12 percent

*AC2 horizon:*

Color—hue of 5YR or 7.5YR, value of 5 to 8, and chroma of 4 to 8

Texture—loamy fine sand or fine sand

Reaction—slightly acid to moderately alkaline

Clay content—2 to 12 percent

*C horizon:*

Color—hue of 5YR or 7.5YR, value of 5 to 8, and chroma of 4 to 8

Texture—loamy fine sand or fine sand

Reaction—slightly acid to moderately alkaline

Clay content—2 to 12 percent

### ***Gracemore Series***

*Major land resource area:* Central Rolling Red Plains (78C) and Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material and geologic age:* Calcareous sandy alluvium of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 2 percent

*Slope shape:* Linear-linear/concave

*Elevation range:* 700 to 2,300 feet

*Mean annual precipitation:* 22 to 38 inches

*Mean annual air temperature:* 57 to 64 degrees F

*Frost-free days:* 185 to 230

*Thorntwaite PE index:* 32 to 64

*Taxonomic class:* Sandy, mixed, thermic Oxyaquic Udifluvents

#### **Associated Soils**

- Daycreek soils which do not have an irregular decrease in organic matter as depth increases; in areas adjacent to but not on flood plains

- Ezell soils which have a water table within a depth of 12 inches and pond water for long periods of time
- Gaddy soils which do not have a water table within a depth of 40 inches most of the year and are dry for longer periods of time; in the slightly higher positions
- Gracemont soils which have horizons of fine sandy loam below a depth of 10 inches; in landscape positions similar to those of the Gracemore soils
- Heman soils which have strongly contrasting particle-size classes in the control section; in the slightly higher landscape positions
- Goodnight and Jester soils which have eolian sediments in dune areas and do not have a water table
- Lincoln soils which do not have a water table within a depth of 40 inches most of the year and are dry for longer periods of time; in the slightly higher landscape positions
- Westola and Yahola soils which do not have a water table within a depth of 40 inches most of the year, are dry for longer periods of time, and have a horizon of fine sandy loam below a depth of 10 inches; in the slightly higher landscape positions
- Port soils which have a mollic epipedon, have a fine silty control section, and do not have a water table within a depth of 40 inches

### Typical Pedon

Gracemore loamy fine sand; Canadian County, Oklahoma; about 12 miles west and 6 miles south of El Reno, 600 feet north and 300 feet west of the southeast corner of sec. 5, T. 11 N., R. 9 W. (Colors are for moist soil unless otherwise stated.)

- A—0 to 12 inches; brown (7.5YR 4/4) loamy fine sand, brown (7.5YR 5/4) dry; weak fine granular structure; soft, very friable; many fine roots; calcareous; moderately alkaline; clear smooth boundary.
- C—12 to 72 inches; brown (7.5YR 5/4) fine sand, pink (7.5YR 6/4) dry; single grained; loose, very friable; very thin to 1-inch-thick strata of darker fine sandy loam and clay loam that decrease in number as depth increases; bedding planes are evident; calcareous; moderately alkaline.

### Range in Characteristics

*Content and size of coarse fragments:* 0 to 10 percent, by volume, rounded gravel throughout the profile; as much as 3 inches in diameter

*Depth to carbonates:* 0 to 10 inches

*Depth to a fluctuating water table:* 6 to 42 inches

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 3 to 7 (moist) and 4 to 8 (dry), and chroma of 1 to 6; where moist value and chroma are 3 or less, the horizon is less than 10 inches thick

Texture—fine sand, loamy fine sand, fine sandy loam, loam, clay loam, or very fine sandy loam in the upper 10 inches; loamy fine sand or fine sand below a depth of 10 inches

Reaction—moderately alkaline or slightly alkaline; horizon is calcareous

Electrical conductivity of saturation extract—0 to 16 mmhos/cm

#### *C horizon:*

Color—hue of 5YR to 10YR, value of 4 to 7 (moist) and 5 to 8 (dry), and chroma of 2 to 6; finer strata are darker and contain more organic carbon than the mass of the horizon

Texture—loamy fine sand or fine sand that is stratified with thin strata of finer material ranging from fine sandy loam to clay loam

Reaction—moderately alkaline; horizon is calcareous

Electrical conductivity of saturation extract—0 to 16 mmhos/cm

## ***Grainola Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from shale of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Shoulder and backslope

*Slope range:* 1 to 25 percent

*Slope shape:* Linear-convex

*Elevation range:* 800 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 220

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, active, thermic Udertic Haplustalfs

### **Associated Soils**

- Foraker soils which have smectitic mineralogy; commonly on broad ridges that are slightly higher than the Grainola soils
- Aydelotte soils which have a solum more than 60 inches thick; commonly on broad ridges that are slightly higher than the Grainola soils
- Apperson, Corbin, and Renfrow soils which have a mollic epipedon; commonly on broad ridges that are slightly higher than the Grainola soils
- Kiti, Lucien, and Shidler soils which are less than 20 inches thick, do not have an argillic horizon, and have a mollic epipedon; on ridgetops
- Masham soils which are less than 20 inches thick; typically in the slightly lower landscape positions
- Tamford soils which do not have an argillic horizon; on footslopes
- Piedmont and Renthin soils which have a mollic epipedon; typically in the slightly higher, smoother areas

### **Typical Pedon**

Grainola silty clay loam; Osage County, Oklahoma; in rangeland, about 4 miles west and 3 miles north of Shidler, 1,060 feet east and 280 feet south of the northwest corner of sec. 14, T. 27 N., R. 5 E. (Colors are for dry soil unless otherwise stated.)

Ak—0 to 6 inches; reddish brown (5YR 4/3) very gravelly silty clay loam, dark reddish brown (5YR 3/3) moist; strong medium granular structure; hard, friable; about 25 percent, by volume, flat limestone fragments 2 to 76 mm in diameter and about 10 percent flat limestone fragments more than 76 mm in diameter; about 5 percent calcium carbonate concretions 2 to 76 mm in diameter; calcareous; moderately alkaline; clear smooth boundary. (4 to 10 inches thick)

BAk—6 to 13 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; moderate medium granular structure; hard, firm; about 7 percent, by volume, flat limestone fragments 2 to 76 mm in diameter; about 5 percent calcium carbonate concretions 2 to 76 mm in diameter; calcareous; moderately alkaline; gradual smooth boundary. (0 to 10 inches thick)

Btk1—13 to 28 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; weak medium blocky structure; very hard, very firm; nearly continuous clay films or pressure faces on faces of peds; about 5 percent, by



volume, sandstone fragments 2 to 76 mm in diameter; common fine light olive gray spots of weathered shale; few calcium carbonate concretions; few masses of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (8 to 16 inches thick)

Btk2—28 to 36 inches; reddish brown (2.5YR 4/4) very gravelly silty clay, dark reddish brown (2.5YR 3/4) moist; weak medium blocky structure; very hard, very firm; patchy clay films on faces of peds; about 40 percent, by volume, dark reddish brown and olive gray shale fragments 2 to 76 mm in diameter; few calcium carbonate concretions; common masses of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (0 to 16 inches thick)

Cr—36 to 42 inches; weak red (2.5YR 5/2) shale bedrock; laminated; calcium carbonate films on faces of some fragments; calcareous.

### Range in Characteristics

*Thickness of the ochric epipedon:* 4 to 10 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

#### *A horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, loam, silty clay loam, or clay loam or their gravelly, cobbly, bouldery, or stony counterparts

Reaction—neutral to moderately alkaline

Clay content—15 to 35 percent

Content and size of coarse fragments of hard limestone or sandstone—0 to 55 percent, by volume (0 to 35 percent are fragments less than 76 mm in diameter, 0 to 20 percent are fragments 76 to 250 mm in diameter, and 0 to 20 percent are fragments 250 to 375 mm in diameter)

#### *BA horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam, clay loam, clay, or silty clay or their gravelly, cobbly, stony, or bouldery counterparts

Reaction—moderately alkaline; horizon is calcareous

Clay content—35 to 60 percent

Content and size of coarse fragments of hard limestone or sandstone—0 to 55 percent, by volume (0 to 35 percent are fragments less than 76 mm in diameter, 0 to 20 percent are fragments 76 to 250 mm in diameter, and 0 to 20 percent are fragments 250 to 375 mm in diameter)

#### *Btk1 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 8

Texture—silty clay loam, clay loam, clay, or silty clay

Reaction—moderately alkaline; horizon is calcareous

Clay content—35 to 60 percent

Content and size of coarse fragments—0 to 15 percent, by volume, soft shale fragments less than 76 mm in diameter

Other features—coarse fragments slake in water within 15 hours

#### *Btk2 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 8

Texture—clay loam, silty clay loam, clay, or silty clay or their gravelly or very gravelly counterparts

Reaction—moderately alkaline; horizon is calcareous

Clay content—35 to 60 percent

Content and size of coarse fragments—5 to 45 percent, by volume, soft shale fragments less than 76 mm in diameter

Carbonates—0 to 10 percent, by volume, masses of calcium carbonate

Other features—coarse fragments slake in water within 15 hours

*BC horizon (if it occurs):*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 2 to 8

Texture—clay loam, silty clay loam, clay, or silty clay or their gravelly, very gravelly, or extremely gravelly counterparts

Reaction—moderately alkaline; horizon is calcareous

Clay content—35 to 60 percent

Content and size of coarse fragments—5 to 70 percent, by volume, soft shale fragments less than 76 mm in diameter

Carbonates—0 to 10 percent, by volume, masses of calcium carbonate

Other features—coarse fragments slake in water within 15 hours

*Cr horizon:*

Color—hue of 10R to 5YR, value of 3 to 5, and chroma of 2 to 6; horizon is streaked or spotted in grayish, brownish, yellowish, or olive shades in some pedons

Texture—weathered shale that has thin strata of sandstone and limestone

Excavation difficulty—high or very high

## **Grant Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from silty sandstone or silty shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Dissected terrace

*Landform position:* Summit, shoulder, and backslope

*Slope range:* 0 to 20 percent

*Slope shape:* Linear-linear/convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 57 to 63 degrees F

*Frost-free days:* 190 to 220

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-silty, mixed, superactive, thermic Udic Argiustolls

### **Associated Soils**

- Bethany soils which have more than 35 percent clay in the textural control section
- Lucien, Nash, and Nashville soils which do not have an argillic horizon and have bedrock within a depth of 40 inches; on side slopes
- Norge soils in the lower positions on side slopes
- Pond Creek soils in the lower positions on broad flats

### **Typical Pedon**

Grant silt loam; Garfield County, Oklahoma; about 2 miles north and 6 1/2 miles west of



Hillsdale, 500 feet south and 100 feet east of the northwest corner of sec. 6, T. 24 S., R. 8 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 7 inches; brown (7.5YR 5/2) silt loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many fine roots; slightly acid; clear smooth boundary.
- A—7 to 12 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable; many fine roots; slightly acid; gradual smooth boundary.
- AB—12 to 16 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, very friable; many fine roots; neutral; gradual smooth boundary.
- Bt—16 to 32 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; clay films on faces of peds; neutral; gradual smooth boundary.
- BC—32 to 47 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable; few fine roots; slightly alkaline; gradual smooth boundary.
- C—47 to 59 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; massive; hard, friable; few fine roots; common medium fragments of sandstone; calcareous; moderately alkaline; clear smooth boundary.
- Cr—59 to 72 inches; red (2.5YR 5/6) weakly consolidated sandstone, red (2.5YR 4/6) moist; calcareous in seams.

#### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to bedrock:* 40 to 60 inches

*Depth to carbonates:* 30 to 60 inches

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5 (dry) and 3 (moist), and chroma of 2 or 3

Texture—silt loam, very fine sandy loam, or loam

Reaction—slightly acid to slightly alkaline

#### *AB or BA horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5 (dry) and 3 or 4 (moist), and chroma of 2 to 4

Texture—silt loam, very fine sandy loam, or loam

Reaction—slightly acid to slightly alkaline

#### *Bt horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5 (dry) and 3 or 4 (moist), and chroma of 2 to 8

Texture—silt loam, loam, very fine sandy loam, silty clay loam, or clay loam

Reaction—slightly acid to moderately alkaline; the lower part of horizon is calcareous in some pedons

Clay content—18 to 35 percent

#### *BC horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6 (dry) and 3 to 5 (moist), and chroma of 4 to 8

Texture—silt loam, loam, very fine sandy loam, silty clay loam, or clay loam

Reaction—neutral to moderately alkaline; horizon is calcareous in some pedons

*C horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 7 (dry) and 3 to 6 (moist), and chroma of 4 to 8

Texture—silt loam, loam, or very fine sandy loam

Reaction—slightly alkaline or moderately alkaline; horizon is noncalcareous in some pedons

Content and size of coarse fragments—0 to 20 percent, by volume, sandstone fragments 5 mm to 1 inch in diameter

*Cr horizon:*

Color—reddish

Texture—soft bedrock of silty sandstone or silty shale

Reaction—slightly alkaline or moderately alkaline; horizon may or may not be calcareous

Hardness—material is mainly nonparalithic with an excavation difficulty of low or moderate; some layers may be paralithic with a high excavation difficulty

Moist bulk density—1.85 to more than 2.0 gm/cm<sup>3</sup>

**Harrah Series**

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Sandy and loamy colluvial material weathered from sandstone of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Footslope

*Slope range:* 3 to 45 percent

*Slope shape:* Concave-linear

*Elevation range:* 1,000 to 1,300 feet

*Mean annual precipitation:* 30 to 38 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 190 to 220

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Fine-loamy, siliceous, active, thermic Ultic Paleustalfs

**Associated Soils**

- Darnell and Darsil soils which do not have an argillic horizon and are less than 20 inches thick over sandstone; mainly on ridge crests
- Pulaski soils which do not have an argillic horizon, have an irregular decrease in organic carbon as depth increases, and have a coarse-loamy control section; on flood plains
- Tribbey soils which do not have an argillic horizon, have an irregular decrease in organic carbon as depth increases, have a coarse-loamy control section, and have a water table within a depth of 40 inches most of the time; on flood plains
- Stephenville soils which have a solum less than 40 inches thick; in the slightly higher areas

**Typical Pedon**

Harrah fine sandy loam; Cleveland County, Oklahoma; on a 6 percent convex

east-facing slope, in a severely eroded field that has been reseeded to native grasses, about 10 miles east and 2.6 miles north of the intersection of U.S. Highway 77 and Robinson Street in Norman, about 2,350 feet south and 900 feet east of the northwest corner of sec. 12, T. 9 N., R. 1 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 9 inches; brown (7.5YR 5/2) fine sandy loam, brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (2 to 10 inches thick)
- E—9 to 19 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (0 to 20 inches thick)
- Bt1—19 to 34 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak fine blocky structure; hard, firm; thin nearly continuous clay films on faces of peds; slightly acid; gradual wavy boundary. (10 to 25 inches thick)
- Bt2—34 to 52 inches; red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; moderate medium prismatic structure parting to moderate medium blocky; hard, firm; thin nearly continuous clay films on faces of peds; about 5 percent, by volume, uncoated sand grains on vertical faces of peds and in pores; moderately acid; gradual wavy boundary. (12 to 45 inches thick)
- Btb1—52 to 76 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium prismatic structure parting to moderate medium blocky; hard, firm; thin continuous clay films on faces of peds; about 20 percent, by volume, uncoated sand grains on vertical faces of peds and in pores; moderately acid; gradual wavy boundary. (0 to 28 inches thick)
- Btb2—76 to 86 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium blocky structure; hard, firm; thin continuous clay films on faces of peds; few fine dark concretions; about 10 percent, by volume, uncoated sand grains on vertical faces of peds and in pores; slightly acid.

### Range in Characteristics

*Thickness of the solum:* More than 60 inches

*Ap or A horizon:*

Color—hue of 5YR or 10YR, value of 4 to 6, and chroma of 2 to 4  
 Texture—fine sandy loam or loamy fine sand  
 Reaction—very strongly acid to neutral  
 Clay content—5 to 18 percent

*E horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 to 7, and chroma of 4 to 6  
 Texture—fine sandy loam or loamy fine sand  
 Reaction—very strongly acid to neutral  
 Clay content—5 to 18 percent

*Bt horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—sandy clay loam or fine sandy loam  
 Reaction—very strongly acid to neutral  
 Clay content—18 to 35 percent

*Btb horizon:*

Color—hue of 10R or 2.5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—fine sandy loam or sandy clay loam  
 Reaction—very strongly acid to neutral  
 Clay content—18 to 35 percent

## ***Hawley Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* High flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 750 to 1,300 feet

*Mean annual precipitation:* 30 to 40 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 190 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-loamy, mixed, active, thermic Fluventic Haplustepts

### **Associated Soils**

- Canadian and Crisfield soils which have a mollic epipedon
- Dale soils which have a mollic epipedon and a fine-silty control section
- Reinach soils which have a mollic epipedon and a coarse-silty control section
- Lela and McLain soils which have a mollic epipedon and a fine control section
- Miller soils which have a mollic epipedon and a fine control section; on flood plains at the lower elevations
- Port soils which have a mollic epipedon and a fine-silty control section; on flood plains at the lower elevations
- Yahola soils which do not have a cambic horizon and are calcareous within a depth of 10 inches; on flood plains at the lower elevations
- Gaddy soils which do not have a cambic horizon, are calcareous within a depth of 10 inches, and have a sandy control section; on flood plains at the lower elevations
- Pocasset soils which are in the lower landscape positions

### **Typical Pedon**

Hawley fine sandy loam; Grant County, Oklahoma; in a cultivated area, 6 miles north and 3 miles east of Nash, 1,900 feet west and 140 feet south of the northeast corner of sec. 7, T. 26 N., R. 7 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 9 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable; moderately acid; clear smooth boundary. (0 to 11 inches thick)

A—9 to 18 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak coarse prismatic structure parting to weak fine granular; slightly hard, friable; neutral; gradual smooth boundary. (7 to 18 inches thick)

Bw—18 to 34 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure; soft, very friable; slightly alkaline; gradual smooth boundary. (7 to 40 inches thick)

C1—34 to 50 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable; strata  $\frac{1}{4}$  inch to 4 inches thick of loamy fine sand and very fine sandy loam; moderately alkaline; gradual smooth boundary. (11 to 32 inches thick)

C2—50 to 66 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2) moist; massive;

slightly hard, friable; strata  $\frac{1}{4}$  inch to 4 inches thick of very fine sandy loam, silt loam, and silty clay loam; few soft powdery masses and threads of calcium carbonate; calcareous; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to 50 inches

*Content of organic matter:* Less than 1 percent in the Ap or A horizon

*Other features:* Some pedons have buried horizons below a depth of 25 inches

#### *Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4

Texture—loam, fine sandy loam, or loamy fine sand

Reaction—moderately acid to slightly alkaline

Clay content—5 to 20 percent

#### *A horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4

Texture—fine sandy loam or loam

Reaction—slightly acid to slightly alkaline

Clay content—5 to 20 percent

#### *Bw horizon:*

Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—fine sandy loam or loam

Reaction—slightly acid to moderately alkaline

Clay content—7 to 18 percent

#### *C horizon:*

Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6

Texture—typically fine sandy loam, sandy loam, or loam; range includes loamy fine sand or fine sand that is stratified with silt loam, silty clay loam, sandy clay loam, and loamy very fine sand in some pedons below a depth of 40 inches

Reaction—slightly acid to moderately alkaline

Clay content—5 to 30 percent

## **Huska Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Deep

*Drainage class:* Moderately well drained

*Parent material and geologic age:* Interbedded shale and sandstone of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 5 percent

*Slope shape:* Linear-convex or convex-linear

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Mollic Natrustalfs

### Associated Soils

- Chickasha and Zaneis soils which have fine-loamy control sections and do not have natric horizons; on landscapes similar to those of the Huska soils
- Grainola and Renfrow soils which do not have a natric horizon; commonly on landscapes below the Huska soils
- Lucien soils which do not have a natric horizon and have a solum less than 20 inches thick; on landscapes similar to those of the Huska soils

### Typical Pedon

Huska silt loam; Payne County, Oklahoma; on a 1 percent slope in rangeland, on the Oklahoma State University Golf Driving Range in Stillwater, 2,200 feet west and 500 feet south of the northeast corner of sec. 10, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 9 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/4) moist; massive; hard, friable; slightly acid; abrupt smooth boundary. (4 to 9 inches thick)
- B<sub>tn</sub>—9 to 18 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; moderate coarse columnar structure; extremely hard, very firm; thick nearly continuous clay films on faces of peds; ped faces are dark reddish brown (5YR 3/2); few fine black concretions; exchangeable sodium percentage of 22; neutral; clear smooth boundary. (7 to 11 inches thick)
- B<sub>tnz1</sub>—18 to 25 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; extremely hard, very firm; thin nearly continuous clay films on faces of peds; few fine faint strong brown (7.5YR 4.6) redoximorphic concentrations; few fine calcium carbonate concretions; common fine visible threads of salts; exchangeable sodium of 39 percent; moderately alkaline; clear smooth boundary. (8 to 18 inches thick)
- B<sub>tnz2</sub>—25 to 34 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak medium blocky structure; extremely hard, very firm; thin nearly continuous clay films on faces of peds; many fine irregular threads of salts; few medium crystals of gypsum; exchangeable sodium of 53 percent; moderately alkaline; clear smooth boundary. (9 to 23 inches thick)
- B<sub>tn</sub>—34 to 50 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; weak fine subangular blocky structure; extremely hard, firm; thin patchy clay films on faces of peds; exchangeable sodium of 52 percent; moderately alkaline; abrupt smooth boundary. (10 to 33 inches thick)
- Cr—50 to 55 inches; slightly gray (5YR 7/1) sandstone; rippable.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Exchangeable sodium percentage:* 15 to 55 in the B<sub>tn</sub> horizon

*Other features:* The electrical conductivity of the saturation extract ranges from 0 to 8 mmhos/cm in the A horizon and from 2 to 16 mmhos/cm in the B<sub>tn</sub> horizon

#### *A horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4; the Ap horizon or materials between the soil surface and a depth of 18 cm after mixing have moist value of 3 or less and dry value of 5 or less (crushed and smoothed sample)

Texture—fine sandy loam, very fine sandy loam, loam, or silt loam

Reaction—moderately acid to slightly alkaline

Clay content—8 to 26 percent

Other features—horizon is typically hard when dry



*Btn horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6  
 Texture—silty clay loam, clay loam, silty clay, or clay  
 Reaction—neutral to moderately alkaline  
 Clay content—35 to 45 percent  
 Redoximorphic features—red concentrations  
 Other features—ped faces have a lower value and chroma than the matrix in most pedons

*Btnz1 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6  
 Texture—silty clay loam, clay loam, silty clay, or clay  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—35 to 60 percent  
 Redoximorphic features—red and brown concentrations  
 Other features—calcium carbonate concretions and visible threads of salts occur in most pedons

*Btnz2 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—silty clay loam, clay loam, clay, or silty clay  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—35 to 60 percent  
 Redoximorphic features—red and brown concentrations  
 Other features—soft bodies of calcium carbonate, threads of salts, and dark concretions occur in most pedons

*B'tn horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—silty clay loam, clay loam, clay, or silty clay  
 Reaction—slightly alkaline or moderately alkaline  
 Clay content—35 to 60 percent  
 Other features—threads and soft bodies of salts occur in some pedons

***Ironmound Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Shallow

*Drainage class:* Well drained

*Parent material and geologic age:* Sandstone or sandstone interbedded with siltstone or sandy shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 40 percent

*Slope shape:* Convex-convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Loamy, mixed, active, thermic, shallow Udic Haplustepts

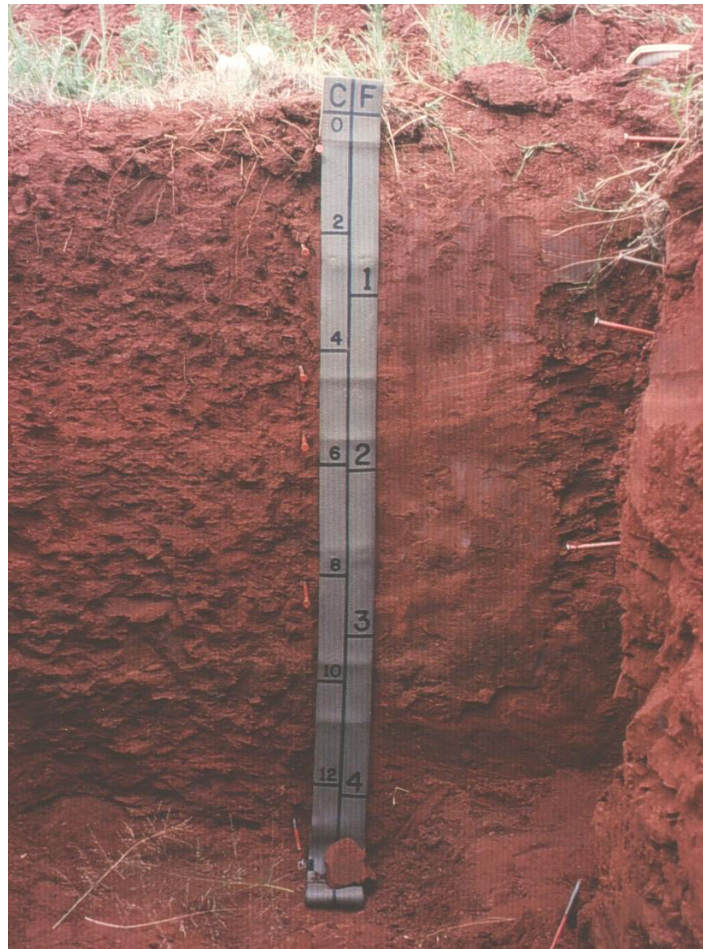


Figure 19.—Profile of Ironmound loam. Multiply the scale on the left by 10 for centimeters.

### Associated Soils

- Coyle and Kingfisher soils which have a solum more than 20 inches thick and have Bt horizons; on landscapes similar to those of the Ironmound soils
- Masham soils which have a fine textured control section; on the lower backslopes
- Grainola and Piedmont soils which have a solum more than 20 inches thick, have Bt horizons, and have a fine textured control section; on the lower backslopes
- Zaneis soils which have a solum more than 20 inches thick and have Bt horizons; on the higher ridge crests and upper backslopes

### Typical Pedon

Ironmound loam (fig. 19); Logan County, Oklahoma; in rangeland, 1 mile west and 2 miles north of Lovell, 500 feet west and 1,300 feet north of the southeast corner of sec. 30, T. 19 N., R. 4 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 7 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure parting to moderate medium granular; hard, friable; many very fine and fine roots; common very fine and fine pores; slightly acid; clear smooth boundary. (4 to 8 inches thick)

Bw—7 to 16 inches; red (2.5YR 4/6) loam, dark red (2.5YR 3/6) moist; moderate



medium subangular blocky structure; hard, friable; common very fine and fine roots; common very fine and fine pores; neutral; clear smooth boundary. (5 to 14 inches thick)

Cr—16 to 40 inches; red (2.5YR 4/6) weathered sandstone, dark red (2.5YR 3/6) moist; neutral.

### Range in Characteristics

*Thickness of the ochric epipedon:* 4 to 8 inches

*Thickness of the solum:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches

#### *A horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 6

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam

Reaction—moderately acid to moderately alkaline

Clay content—10 to 25 percent

Content and size of coarse fragments—0 to 10 percent, by volume, sandstone gravel less than 76 mm in diameter

#### *Bw horizon:*

Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 4 to 6

Texture—loam or fine sandy loam

Reaction—slightly acid to moderately alkaline

Clay content—10 to 27 percent

Content and size of coarse fragments—0 to 10 percent, by volume, sandstone gravel less than 76 mm in diameter

#### *Cr horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—weathered sandstone or shale or sandstone that is interbedded with siltstone or shale

Excavation difficulty—high or very high

Reaction—neutral to moderately alkaline

## **Kingfisher Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy material weathered from silty red beds of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 0 to 8 percent

*Slope shape:* Linear-convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-silty, mixed, active, thermic Udic Argiustolls

### Associated Soils

- Bethany and Grant soils which are on nearby landscapes
- Norge and Pond Creek soils which are on the lower landscapes of high stream terraces
- Grainola soils which do not have a mollic epipedon and have more than 35 percent clay in the textural control section; in landscape positions similar to those of the Kingfisher soils
- Lucien and Ironmound soils which do not have a Bt horizon and are less than 20 inches thick over sandstone; on adjacent landscapes, commonly in the more sloping areas
- Ironmound soils which do not have a mollic epipedon
- Nash soils which do not have a Bt<sub>2</sub> horizon and contain less than 18 percent clay in the control section; on nearby landscapes
- Piedmont and Renthin soils which have more than 35 percent clay in the textural control section; on adjacent landscapes, commonly in the more sloping areas

### Typical Pedon

Kingfisher silt loam; Kingfisher County, Oklahoma; in a cultivated area, about 1 mile west and 5 miles south of Kingfisher, 1,800 feet west and 50 feet south of the northeast corner of sec. 16, T. 15 N., R. 7 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 14 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, friable; many fine roots; upper 6 inches mixed by cultivation; many fine pores; slightly acid; gradual smooth boundary. (8 to 16 inches thick)
- BA—14 to 21 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse granular structure; hard, friable; many fine roots; neutral; gradual smooth boundary. (3 to 10 inches thick)
- Bt<sub>1</sub>—21 to 32 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm; common fine roots throughout peds; distinct continuous clay films on faces of peds; slightly alkaline; gradual smooth boundary. (6 to 16 inches thick)
- Bt<sub>2</sub>—32 to 38 inches; reddish brown (2.5YR 4/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm; few fine pores; few fine roots; distinct continuous clay films on faces of peds; moderately alkaline; gradual smooth boundary. (2 to 10 inches thick)
- Cr—38 to 46 inches; red (2.5YR 5/8) weathered silty shale red beds, red (2.5YR 4/8) moist; weakly effervescent.

### Range in Characteristics

*Thickness of the mollic epipedon:* 8 to 16 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

#### *Ap horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam or silt loam

Reaction—slightly acid to slightly alkaline

Clay content—15 to 27 percent

#### *BA horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, silty clay loam, or clay loam

Reaction—slightly acid or slightly alkaline

Clay content—25 to 35 percent

*Bt1 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay loam or clay loam

Reaction—slightly acid to moderately alkaline

Clay content—27 to 35 percent

*Bt2 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay loam, clay loam, or silty clay

Reaction—slightly acid to moderately alkaline

Clay content—27 to 42 percent

*BC horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay loam, clay loam, or silty clay

Reaction—neutral to moderately alkaline

Clay content—27 to 42 percent

*Cr horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Texture—weathered interbedded siltstone, shale, and sandstone

Hardness—horizon is paralithic and has high excavation difficulty

Reaction—slightly alkaline or moderately alkaline

## ***Kirkland Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from predominantly clayey mantles over shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Tread

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear/concave

*Elevation range:* 800 to 1,300 feet

*Frost-free days:* 190 to 230

*Mean annual precipitation:* 26 to 38 inches

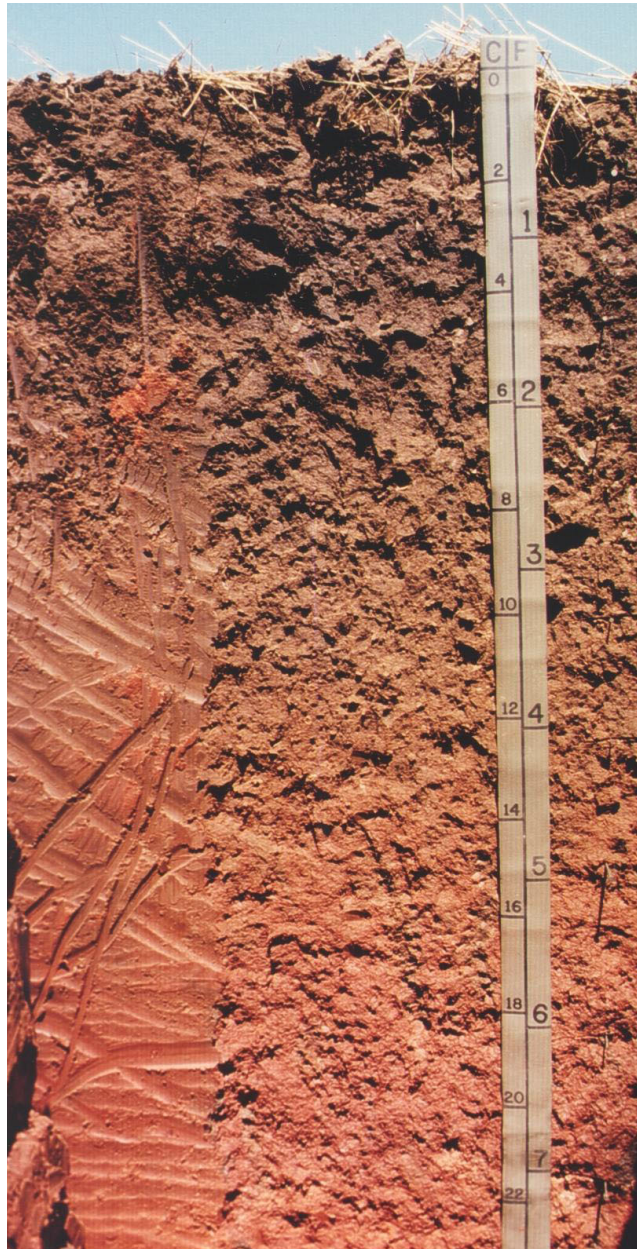
*Mean annual air temperature:* 58 to 64 degrees F

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Udertic Paleustolls

### **Associated Soils**

- Renfrow soils which are on side slopes on the lower parts of the landscape
- Aydelotte and Grainola soils which do not have a mollic epipedon; on side slopes on the lower parts of the landscape
- Bethany soils which are on the slightly higher parts of the landscape
- Pawhuska and Doolin soils which have a natric horizon; on nearby landscapes
- Pond Creek soils which are fine silty; on high terraces



**Figure 20.—Profile of Kirkland silt loam. Multiply the scale on the left by 10 for centimeters.**

- Tabler soils which are on the same landscape as the Kirkland soils but in the slightly lower positions
- Waurika soils which are on nearby landscapes in the slightly concave areas
- Renthin and Piedmont soils which have a solum less than 60 inches thick; on side slopes on the lower parts of the landscape

#### **Typical Pedon**

Kirkland silt loam, 0 to 1 percent slopes (fig. 20); Logan County, Oklahoma; in a cultivated area, about 4 miles south and 8 miles west of Guthrie, 1,000 feet north and



150 feet west of the southeast corner of sec. 36, T. 16 N., R. 4 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 8 inches; dark grayish brown (10YR 4/2, exterior) and grayish brown (10YR 5/2, crushed) silt loam, very dark brown (10YR 2/2, exterior) and very dark grayish brown (10YR 3/2, crushed) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable; common very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; electrical conductivity of the saturation extract is less than 1 mmho/cm; sodium adsorption ratio of less than 1; strongly acid; abrupt wavy boundary. (6 to 14 inches thick)
- Bt1—8 to 19 inches; dark grayish brown (10YR 4/2, exterior) and dark grayish brown (10YR 4/2, crushed) silty clay, black (10YR 2/1, exterior) and very dark gray (10YR 3/1, crushed) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, very firm; common very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; few fine rounded iron-manganese concretions; 65 percent of volume has distinct discontinuous clay films in root channels and pores; electrical conductivity of the saturation extract is less than 1 mmho/cm; sodium adsorption ratio of 2; neutral; gradual smooth boundary. (11 to 15 inches thick)
- Bt2—19 to 28 inches; brown (7.5YR 4/2, exterior) and (7.5YR 4/3, crushed) silty clay, dark brown (7.5YR 3/2, exterior) and (7.5YR 3/3, crushed) moist; weak medium and coarse prismatic structure parting to strong medium subangular blocky; extremely hard, extremely firm; common very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; about 2 percent of volume is prominent continuous intersecting slickensides on faces of peds; electrical conductivity of the saturation extract is less than 1 mmho/cm; sodium adsorption ratio of 4; slightly alkaline; clear smooth boundary. (6 to 20 inches thick)
- Btk—28 to 42 inches; brown (7.5YR 4/2, exterior) and brown (7.5YR 4/3, crushed) silty clay, dark brown (7.5YR 3/2, exterior) and dark brown (7.5YR 3/3, crushed) moist; weak medium and coarse prismatic structure parting to strong medium angular blocky; extremely hard, extremely firm; common very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; few fine and medium irregular carbonate threads; few medium rounded carbonate concretions; few medium rounded iron-manganese concretions; common distinct discontinuous clay films on faces of peds; common prominent continuous intersecting slickensides; electrical conductivity of the saturation extract is 1 mmho/cm; sodium adsorption ratio of 6; strongly effervescent; moderately alkaline; gradual wavy boundary. (10 to 20 inches thick)
- 2Bt1—42 to 51 inches; brown (7.5YR 4/4, exterior) and dark brown (7.5YR 3/4, crushed) silty clay, dark brown (7.5YR 3/4, exterior) and dark brown (7.5YR 3/4, crushed) moist; strong medium prismatic structure parting to strong medium angular blocky; extremely hard, extremely firm; few very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; few fine and medium rounded iron-manganese concretions; common faint continuous clay films on faces of peds; common distinct continuous intersecting slickensides; electrical conductivity of the saturation extract is 1.5 mmhos/cm; sodium adsorption ratio of 7; strongly effervescent; moderately alkaline; gradual wavy boundary. (0 to 16 inches thick)
- 2Btk—51 to 60 inches; reddish brown (2.5YR 4/4, exterior) and reddish brown (2.5YR 4/4, crushed) silty clay, dark reddish brown (2.5YR 3/4, exterior) and dark reddish brown (2.5YR 3/4, crushed) moist; moderate medium and coarse prismatic structure parting to strong medium angular blocky; very hard, very firm; common very fine and fine roots throughout horizon; common very fine and fine vesicular and tubular pores; many fine and common medium distinct dark red (2.5YR 3/6)

redoximorphic accumulations associated with root channels; few fine and medium and few coarse rounded iron-manganese concretions; few medium and coarse carbonate concretions; cracks between peds are filled with dark brown (7.5YR 3/3) silty clay loam; 1 percent quartzite pebbles; electrical conductivity of the saturation extract is 1.76 mmhos/cm; sodium adsorption ratio of 8; strongly effervescent; moderately alkaline; gradual wavy boundary. (0 to 18 inches thick)

2Bt2—60 to 75 inches; red (2.5YR 4/6, exterior) and reddish brown (2.5YR 4/4, crushed) silty clay, dark reddish brown (2.5YR 3/6, exterior) and dark red (2.5YR 3/4, crushed) moist; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm; few very fine and fine roots throughout horizon; common fine and common very fine vesicular and tubular pores; cracks between peds filled with dark brown (7.5YR 3/3) silty clay loam from above; common fine and medium prominent gray (10YR 6/1) and very dark gray (10YR 3/1) redoximorphic depletions associated with root channels; electrical conductivity of the saturation extract is 2.16 mmhos/cm; sodium adsorption ratio of 8; strongly effervescent; slightly alkaline; diffuse wavy boundary. (0 to 15 inches thick)

2Bt3—75 to 82 inches; red (2.5YR 4/6, exterior) and reddish brown (2.5YR 4/4, crushed) silty clay, dark red (2.5YR 3/6, exterior) and dark reddish brown (2.5YR 3/4, crushed) moist; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm; common very fine roots throughout horizon; common fine and very fine vesicular and tubular pores; few medium prominent brown (7.5YR 5/3), common fine distinct reddish gray (5YR 5/2), and common fine prominent very dark grayish brown (10YR 3/2) redoximorphic accumulations and depletions associated with root channels; few fine irregular threads of calcium carbonate; electrical conductivity of the saturation extract is 2.12 mmhos/cm; sodium adsorption ratio of 7; strongly effervescent; slightly alkaline; abrupt wavy boundary. (0 to 11 inches thick)

3Cr—82 to 98 inches; red (2.5YR 5/8, exterior) weakly cemented sandy siltstone, red (2.5YR 4/8, exterior) moist; very hard, very firm; very few very fine roots in cracks; very slightly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 17 to 25 inches

*Thickness of the solum:* More than 60 inches

*Depth to carbonates:* 25 to 50 inches

*Depth to bedrock:* More than 60 inches

*Other features:* Cracks within a depth of 125 cm that are 5 mm or more wide and extend through a thickness of 30 cm or more for some time in most years; slickensides in a layer 15 cm or more thick that has its upper boundary within a depth of 125 cm; linear extensibility of 6.0 cm or more between the mineral soil surface and a depth of 100 cm

#### *A horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3

Texture—silt loam, clay loam, or silty clay loam

Reaction—moderately acid to neutral

Clay content—13 to 35 percent

Electrical conductivity of the saturation extract—0 to 1 mmho/cm

Sodium adsorption ratio—1 to 4

#### *Bt1 horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3

Texture—clay or silty clay

Reaction—neutral or slightly alkaline

Clay content—40 to 60 percent  
 Electrical conductivity of the saturation extract—0 to 2 mmhos/cm  
 Sodium adsorption ratio—2 to 12

*Bt2 horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4  
 Texture—clay or silty clay  
 Reaction—neutral to moderately alkaline  
 Clay content—40 to 60 percent  
 Electrical conductivity of the saturation extract—0 to 2 mmhos/cm  
 Sodium adsorption ratio—2 to 12

*Btk horizon:*

Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6  
 Texture—clay, silty clay, clay loam, or silty clay loam  
 Reaction—slightly alkaline or moderately alkaline; horizon is calcareous  
 Clay content—35 to 60 percent  
 Electrical conductivity of the saturation extract—2 to 4 mmhos/cm  
 Sodium adsorption ratio—3 to 16

*2Bt and 2Btk horizons:*

Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 8  
 Texture—clay, silty clay, clay loam, or silty clay loam  
 Reaction—slightly alkaline or moderately alkaline; horizon is calcareous  
 Clay content—35 to 60 percent  
 Electrical conductivity of the saturation extract—2 to 4 mmhos/cm  
 Sodium adsorption ratio—3 to 16  
 Redoximorphic features—common redoximorphic accumulations and depletions in shades of red, brown, or gray

*3Cr horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 2 to 8  
 Texture—weakly consolidated shale, clay, or siltstone  
 Excavation difficulty—low or moderate  
 Reaction—moderately alkaline; horizon is calcareous

## ***Konawa Series***

*Major land resource area:* Northern Cross Timbers (84A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Sandy and loamy stream terrace sediments of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Tread and riser

*Slope range:* 0 to 20 percent

*Slope shape:* Linear/convex-convex

*Elevation range:* 500 to 1,500 feet

*Mean annual precipitation:* 30 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Fine-loamy, mixed, active, thermic Ultic Haplustalfs

### Associated Soils

- Dougherty and Stidham soils which are in areas of the landscape similar to those of the Konawa soils but, in some places, are in the slightly higher areas
- Bastrop soils which have thicker argillic horizons that do not decrease in clay content as depth increases; on broad flat landscapes that are slightly higher and farther from the stream channel than the Konawa soils
- Eufaula soils which have A horizons more than 20 inches thick and have a sandy control section; on the slightly higher landscapes
- Teller soils which have a mollic epipedon; commonly on landscapes similar to those of the Konawa soils but farther from the stream channel

### Typical Pedon

Konawa fine sandy loam (fig. 21); Payne County, Oklahoma; in bermudagrass pasture, about 8 miles west and 1 mile south of Perkins, 2,000 feet north and 200 feet west of the southeast corner of sec. 10, T. 17 N., R. 1 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 9 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; slightly acid; clear smooth boundary. (4 to 10 inches thick)
- E—9 to 17 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; slightly acid; clear smooth boundary. (0 to 17 inches thick)
- Bt—17 to 53 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; very hard, friable; thin discontinuous clay films on peds; moderately acid; gradual smooth boundary. (10 to 36 inches thick)
- BC—53 to 72 inches; red (2.5YR 5/6) fine sandy loam, red (5YR 4/6) moist; weak coarse subangular blocky structure; very hard, friable; neutral.

### Range in Characteristics

*Thickness of the ochric epipedon:* 4 to 20 inches

*Thickness of the solum:* 48 to more than 72 inches

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 to 7, and chroma of 2 to 6  
 Texture—fine sandy loam, loamy fine sand, or fine sand  
 Reaction—strongly acid to slightly acid  
 Clay content—2 to 18 percent

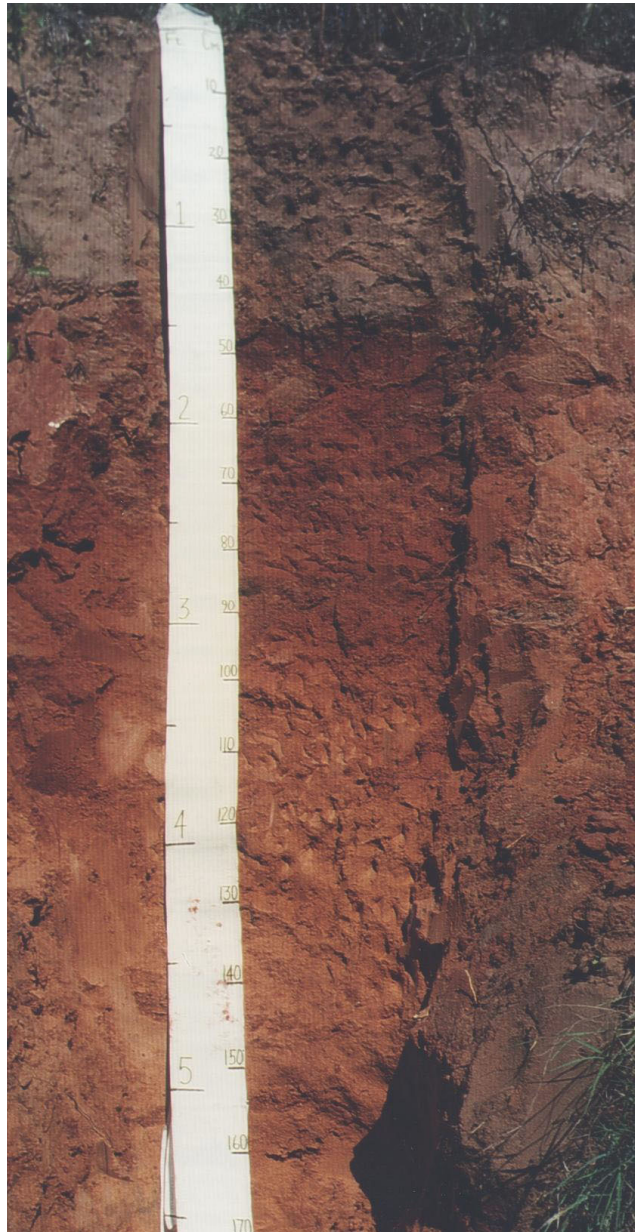
#### *E horizon:*

Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 2 to 6  
 Texture—fine sandy loam, loamy fine sand, or fine sand  
 Reaction—strongly acid to slightly acid  
 Clay content—2 to 18 percent

#### *Bt horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8  
 Texture—fine sandy loam or sandy clay loam  
 Reaction—strongly acid to neutral  
 Clay content—18 to 30 percent  
 Content and size of coarse fragments—0 to 5 percent, by volume, rounded gravel 2 to 10 mm in diameter





**Figure 21.—Profile of Konawa fine sandy loam. The scale on the right is in centimeters.**

*BC horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8

Texture—fine sandy loam, sandy clay loam, or loamy fine sand

Reaction—strongly acid to neutral

Clay content—7 to 30 percent

*C horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8

Texture—fine sandy loam, loamy fine sand, or fine sand

Reaction—strongly acid to slightly alkaline

Clay content—7 to 30 percent

## **Lawrie Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* High flood plain or low flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,400 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-silty, mixed, superactive, thermic Pachic Argiustolls (fig. 22)

### **Associated Soils**

- Ashport and Port soils which are at the lower elevations on flood plains, nearer to the stream than the Lawrie soils
- Easpor soils which have a fine-loamy control section; at the lower elevations on flood plains, nearer to the stream than the Lawrie soils
- Yahola and Pulaski soils which have a coarse-loamy control section; at the lower elevations on flood plains, nearer to the stream than the Lawrie soils
- Norge soils which are on stream terraces farther from the stream than the Lawrie soils
- Teller soils which have a fine-loamy control section; on stream terraces farther from the stream than the Lawrie soils

### **Typical Pedon**

Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded; Logan County, Oklahoma; in a cultivated area, 1,800 feet east and 700 feet south of the northwest corner of sec. 27, T. 17 N., R. 1 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; reddish brown (5YR 4/3, crushed) loam, dark reddish brown (5YR 3/3, crushed) moist; moderate fine subangular blocky structure parting to moderate medium granular; soft, very friable; many very fine and fine roots throughout horizon; common very fine and fine discontinuous tubular pores; moderately acid (pH 5.8); abrupt smooth boundary. (6 to 25 inches thick)

Ad—6 to 10 inches; reddish brown (5YR 4/3, crushed) loam, dark reddish brown (5YR 3/2, crushed) moist; moderate coarse subangular blocky structure; very hard, very firm; many very fine and fine roots between pedis; few very fine discontinuous tubular pores; slightly acid (pH 5.8); abrupt smooth boundary. (0 to 4 inches thick)

Bt1—10 to 19 inches; reddish brown (5YR 4/3, crushed) silt loam, dark reddish brown (5YR 3/3, crushed) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, friable; common very fine and fine roots throughout horizon; many very fine and many fine continuous tubular pores; common faint discontinuous clay films on faces of pedis; slightly acid (pH 6.0); gradual smooth boundary. (0 to 7 inches thick)

Bt2—19 to 26 inches; reddish brown (5YR 4/3, crushed) silty clay loam, dark reddish brown (5YR 3/3, crushed) moist; moderate medium prismatic structure parting to strong medium angular blocky; hard, very firm; common very fine roots throughout

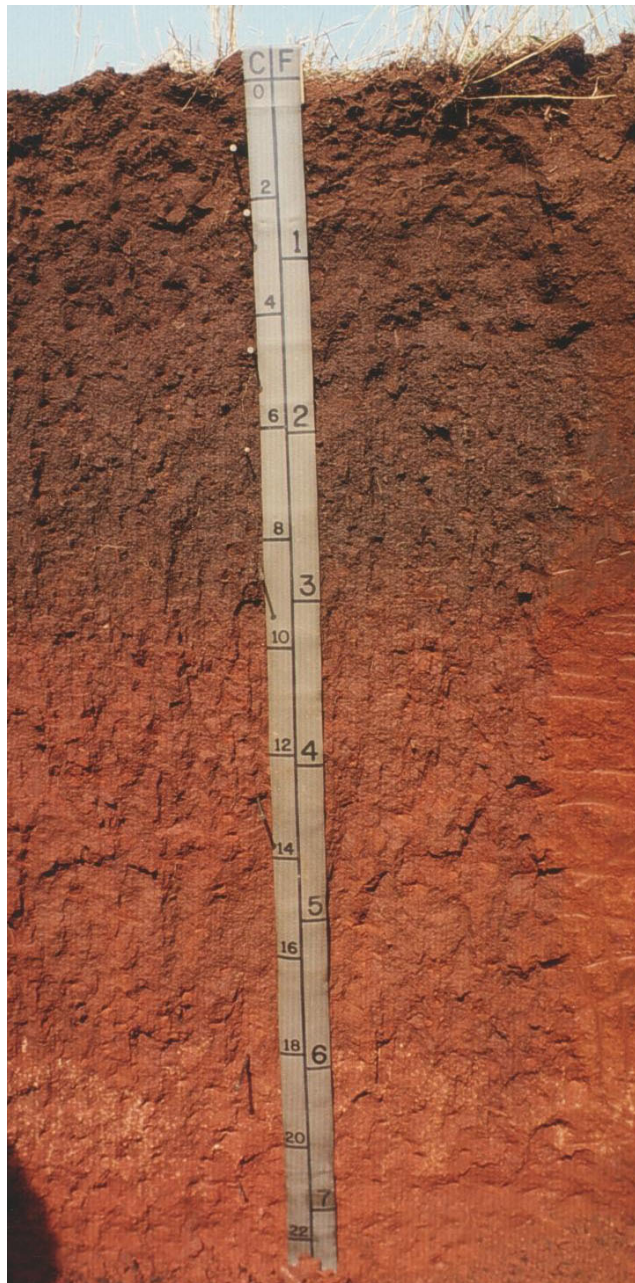


Figure 22.—Profile of Lawrie loam. Multiply the scale on the left by 10 for centimeters.

horizon; many very fine and many fine continuous tubular pores; many distinct continuous clay films on faces of peds; slightly acid (pH 6.3); gradual wavy boundary. (7 to 26 inches thick)

Btb—26 to 34 inches; dark reddish brown (5YR 4/3, crushed) clay loam, dark reddish brown (5YR 3/3, crushed) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm; common very fine roots throughout horizon; common fine and many very fine continuous tubular pores; many distinct continuous clay films on vertical and horizontal faces of peds; slightly acid (pH 6.3); gradual wavy boundary. (7 to 22 inches thick)



- 2Btb1—34 to 51 inches; red (2.5YR 4/6, crushed) loam, red (2.5YR 3/6, crushed) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm; few very fine roots throughout horizon; common fine and many very fine continuous tubular pores; many distinct continuous clay films on vertical and horizontal faces of peds; slightly acid (pH 6.5); diffuse wavy boundary. (0 to 23 inches thick)
- 2Btb2—51 to 72 inches; red (2.5YR 5/6, crushed) loam, red (2.5YR 4/6, crushed) moist; strong coarse prismatic structure parting to strong coarse angular blocky; very hard, firm; few very fine roots throughout horizon; many very fine, few medium, and common fine continuous tubular pores; few faint continuous clay films on vertical and horizontal faces of peds; common fine irregular iron-manganese masses; neutral (pH 7.0); abrupt wavy boundary. (0 to 14 inches thick)
- 2Bkb—72 to 82 inches; red (2.5YR 5/6, crushed) loam, red (2.5YR 4/6, crushed) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm; few very fine roots throughout horizon; many very fine, many fine, and common medium continuous tubular pores; secondary calcium carbonates are long, narrow, vertically oriented bodies of soft lime; many very coarse and extremely coarse cylindrical masses of lime; strongly effervescent (HCl, 1 normal) continuous; moderately alkaline (pH 8.0); gradual wavy boundary. (0 to 23 inches thick)
- 2BCkb—82 to 89 inches; red (2.5YR 5/6, crushed) sandy clay loam, red (2.5YR 4/6) moist; weak medium prismatic structure; hard, friable; few very fine roots between peds; many very fine, many fine, and common medium continuous tubular pores; common fine irregular iron-manganese masses; many very coarse and extremely coarse cylindrical soft masses of lime; few fine and medium dendritic lime nodules; strongly effervescent (HCl, 1 normal) continuous; moderately alkaline (pH 8.0). (0 to 22 inches thick)

### Range in Characteristics

*Thickness of the mollic epipedon:* 20 to 55 inches

*Thickness of the solum:* More than 60 inches

*Depth to carbonates:* 30 to 60 inches

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3

Texture—silt loam or loam

Reaction—typically slightly acid to slightly alkaline; horizon ranges to very strongly acid where nitrogen fertilizer has been used extensively

Clay content—15 to 26 percent

#### *BA horizon (if it occurs):*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam or silty clay loam

Reaction—slightly acid to moderately alkaline

Clay content—15 to 35 percent

#### *Bt and Btb horizons:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam, silt loam, or loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

#### *2Btb horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 6

Texture—silty clay loam, clay loam, or loam

Reaction—slightly acid to moderately alkaline

Clay content—18 to 35 percent

*Bk or 2Bkb horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6

Texture—silty clay loam, clay loam, sandy clay loam, or loam

Reaction—moderately alkaline; horizon is calcareous

Clay content—18 to 38 percent

Other features—masses or concretions of calcium carbonate

*BC, Bck, or 2Bckb horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6

Texture—silty clay loam, clay loam, sandy clay loam, or loam

Reaction—moderately alkaline

## **Lebron Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material and geologic age:* Clayey alluvial sediments over sandy alluvial sediments of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 1 percent

*Slope shape:* Concave-concave

*Elevation range:* 700 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Clayey over sandy or sandy-skeletal, mixed, superactive, thermic Fluvaquentic Hapludolls

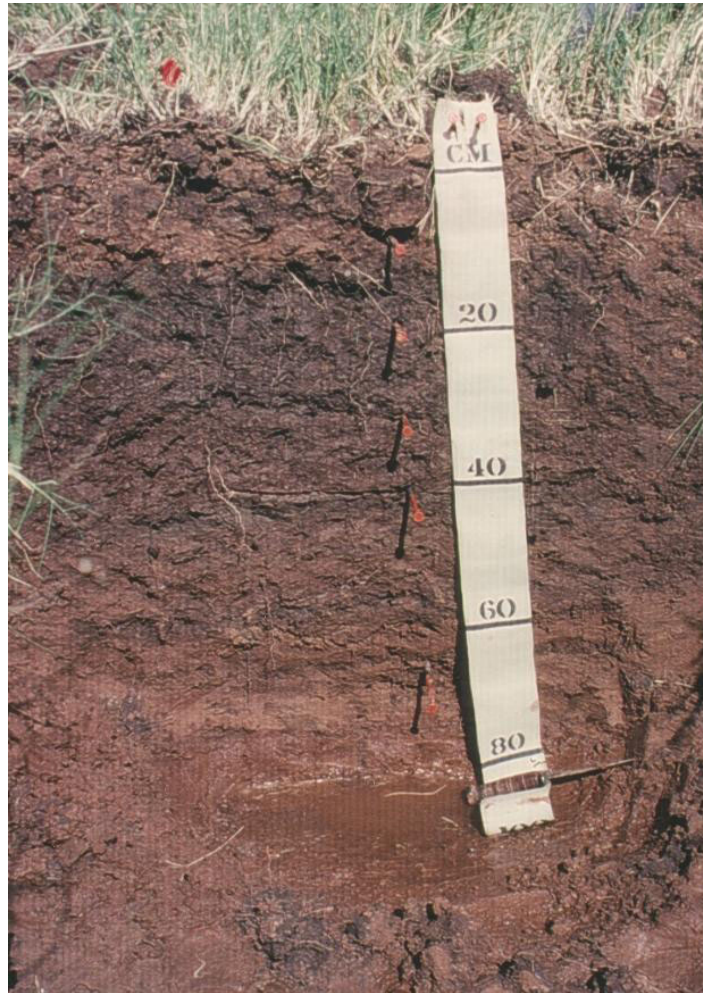
### **Associated Soils**

- Gaddy soils which are typically closer to the drainage system than the Lebron soils
- Goodnight soils which are on dunes
- Yahola soils which are in the slightly higher positions

### **Typical Pedon**

Lebron clay, 0 to 1 percent slopes, occasionally flooded (fig. 23); Logan County, Oklahoma; in pastureland, 3,800 feet east and 120 feet south of the northwest corner of sec. 9, T. 17 N., R. 2 W. (Colors are for dry soil unless otherwise indicated.)

- A1—0 to 5 inches; reddish gray (5YR 5/2) silty clay, dark reddish brown (5YR 3/2) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; extremely hard, extremely firm; many very fine, common fine, and few medium roots; very fine moderate constricted tubular pores; few fine prominent gray (10YR 6/1) redoximorphic depletions; common brown (7.5YR 4/4) rhizospheres; strongly effervescent; moderately alkaline; abrupt smooth boundary. (4 to 12 inches thick)
- Ad—5 to 9 inches; reddish gray (5YR 5/2) silty clay, dark reddish gray (5YR 3/2) moist; weak medium prismatic structure parting to moderate fine blocky; extremely hard,



**Figure 23.—Profile of Lebron clay, 0 to 1 percent slopes, occasionally flooded. The scale is in centimeters.**

- extremely firm; many very fine and few fine and medium roots; common very fine moderate constricted tubular pores; few fine prominent gray (10YR 6/1) redoximorphic depletions; common brown (7.5YR 4/4) rhizospheres; strongly effervescent; moderately alkaline; clear smooth boundary. (0 to 5 inches thick)
- A2—9 to 14 inches; reddish gray (5YR 5/2) silty clay, dark reddish gray (5YR 3/2) moist; weak medium prismatic structure parting to moderate fine blocky; extremely hard, extremely firm; many very fine roots; common very fine constricted tubular pores; few fine prominent gray (10YR 6/1) redoximorphic depletions; common brown (7.5YR 4/4) rhizospheres; strongly effervescent; moderately alkaline; clear smooth boundary. (0 to 5 inches thick)
- C1—14 to 18 inches; reddish brown (5YR 5/3) silty clay, dark reddish brown (5YR 3/3) moist; massive; very hard, very firm; many very fine roots; common distinct strata of loamy fine sand and finer materials  $\frac{1}{8}$  inch to 2 inches thick; many very fine moderate constricted tubular pores; violently effervescent; moderately alkaline; abrupt wavy boundary. (7 to 29 inches thick)
- C2—18 to 28 inches; light reddish brown (5YR 6/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; hard, firm; many very fine roots; common prominent

strata of fine sandy loam and finer materials  $\frac{1}{8}$  inch to 6 inches thick; common very fine moderate constricted pores; violently effervescent; moderately alkaline; abrupt wavy boundary. (0 to 15 inches thick)

2C—28 to 80 inches; light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 5/4) moist; single grained; soft, very friable; common prominent strata of fine sand, sand, silty clay loam, and silt loam  $\frac{1}{8}$  inch to 6 inches thick and 3 to 12 inches apart; strongly effervescent; moderately alkaline. (20 to 51 inches thick)

### Range in Characteristics

*Depth to carbonates:* Profile is calcareous throughout

#### *A horizon:*

Color—hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 or 3

Texture—clay loam, silty clay loam, silty clay, or clay

Reaction—slightly alkaline or moderately alkaline

Clay content—27 to 60 percent

Redoximorphic features—observable concentrations and depletions

#### *C1 horizon:*

Color—hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4

Texture—stratified silty clay, clay, clay loam, silt loam, or silty clay loam

Reaction—slightly alkaline or moderately alkaline

Clay content—15 to 60 percent

#### *C2 horizon:*

Color—hue of 7.5YR or 5YR, value of 4 to 7, and chroma of 4 to 6

Texture—silt loam that is stratified with finer and coarser materials

Reaction—moderately alkaline

Clay content—2 to 14 percent

#### *2C horizon:*

Color—hue of 7.5YR or 5YR, value of 5 to 8, and chroma of 4 to 6

Texture—stratified loamy fine sand, fine sand, or sand

Clay content—2 to 14 percent

## ***Littleaxe Series***

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from weakly cemented sandstone interbedded with weakly cemented shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 5 percent

*Slope shape:* Linear-convex

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 30 to 38 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Fine-loamy, siliceous, active, thermic Ultic Haplustalfs

### Associated Soils

- Darnell and Darsil soils which do not have Bt horizons and are less than 20 inches deep to bedrock; commonly in areas similar to those of the Littleaxe soils
- Harrah soils which have a solum more than 60 inches thick and do not decrease in clay content by 20 percent or more within a depth of 60 inches; on footslopes
- Newalla soils which have an abrupt texture change between the A and Bt horizons and have a fine control section; in areas similar to those of the Littleaxe soils
- Noble soils which have a coarse-loamy control section; on footslopes
- Stephenville soils which have a solum ranging from 20 to 40 inches in thickness; in areas similar to those of the Littleaxe soils

### Typical Pedon

Littleaxe loamy fine sand; Cleveland County, Oklahoma; on a 2 percent convex southeast-facing upland ridge crest, in a forest of post oak and blackjack oak, about 11 miles east of the intersection of Oklahoma State Highway 9 and U.S. Highway 77, about 2,120 feet west and 380 feet south of the northeast corner of sec. 6, T. 8 N., R. 1 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 7 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many very fine and fine roots; neutral; clear wavy boundary. (3 to 10 inches thick)
- E—7 to 16 inches; pink (7.5YR 7/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; many very fine and fine roots; slightly acid; clear wavy boundary. (0 to 11 inches thick)
- Bt1—16 to 28 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable; common very fine, fine, and medium roots; nearly continuous clay films on faces of peds; strongly acid; gradual smooth boundary. (7 to 21 inches thick)
- Bt2—28 to 37 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; very hard, friable; common very fine, fine, and medium roots; patchy clay films on faces of peds; strongly acid; gradual smooth boundary. (0 to 24 inches thick)
- BC1—37 to 43 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; hard, friable; common very fine, fine, and medium roots; patchy clay films on faces of peds; strongly acid; clear smooth boundary. (0 to 18 inches thick)
- BC2—43 to 52 inches; reddish yellow (7.5YR 7/6) fine sandy loam, reddish yellow (7.5YR 6/6) moist; weak coarse subangular blocky structure; hard, friable; few very fine and fine roots; clay bridging sand grains; reddish yellow (7.5YR 6/8) redoximorphic concentrations, strong brown (7.5YR 5/8) moist; strongly acid; clear smooth boundary. (0 to 11 inches thick)
- Cr—52 to 60 inches; reddish yellow (7.5YR 6/8) and yellowish red (5YR 5/6) weakly cemented sandstone interbedded with red (2.5YR 5/8) weakly cemented shale; strongly acid.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to bedrock:* 40 to 60 inches

*A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—loamy fine sand or fine sandy loam

Reaction—strongly acid to neutral

Clay content—3 to 18 percent



*E horizon:*

Color—hue of 5YR or 7.5YR, value of 4 to 7, and chroma of 3 to 6  
Texture—loamy fine sand or fine sandy loam  
Reaction—very strongly acid to slightly acid  
Clay content—3 to 18 percent

*Bt1 horizon:*

Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6  
Texture—sandy clay loam or fine sandy loam  
Reaction—very strongly acid to slightly acid  
Clay content—15 to 35 percent  
Redoximorphic features—red concentrations

*Bt2 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 6 to 8  
Texture—fine sandy loam or sandy clay loam  
Reaction—very strongly acid to slightly acid  
Clay content—15 to 35 percent

*Bt3 horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 6 to 8  
Texture—fine sandy loam or sandy clay loam  
Reaction—very strongly acid to slightly acid  
Clay content—15 to 35 percent

*BC horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 to 7, and chroma of 6 to 8  
Texture—fine sandy loam or sandy clay loam  
Reaction—very strongly acid to slightly acid in the upper part of horizon and strongly acid to neutral in the lower part  
Clay content—14 to 30 percent  
Redoximorphic features—red, yellow, or brown concentrations  
Content and size of coarse fragments—0 to 20 percent, by volume; 2 to 76 mm in diameter

*Cr horizon:*

Color—red, yellow, or brown  
Texture—weathered sandstone

***Lucien Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Shallow

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from sandstone, interbedded with clay, siltstone, or sandy shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 30 percent

*Slope shape:* Convex-convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Loamy, mixed, superactive, thermic, shallow Udic Haplustolls

### **Associated Soils**

- Coyle and Kingfisher soils which have a solum more than 20 inches thick and have Bt horizons; commonly on adjacent side slopes
- Nash soils which have a solum more than 20 inches thick; commonly on adjacent side slopes
- Stoneburg and Zaneis soils which have Bt horizons; commonly on adjacent side slopes
- Grainola and Steedman soils which have Bt horizons, have a fine control section, and have a solum more than 20 inches thick; commonly on adjacent side slopes
- Shidler soils which are on ridges

### **Typical Pedon**

Lucien very fine sandy loam; Noble County, Oklahoma; in rangeland, about 6 miles east and 8 miles north of Perry, 3,000 feet east and 2,450 feet south of the northwest corner of sec. 2, T. 22 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 4 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; slightly hard, very friable; many very fine and fine roots throughout horizon; common irregular wormcasts; few very fine and common fine and medium constricted tubular pores; slightly acid; clear smooth boundary. (4 to 10 inches thick)

BA—4 to 8 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable; common very fine and fine roots throughout horizon; common irregular wormcasts; many very fine and few fine constricted tubular pores; neutral; clear smooth boundary. (3 to 8 inches thick)

Bw—8 to 14 inches; brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable; common very fine and fine roots throughout horizon; common irregular wormcasts; common very fine constricted tubular pores; 10 percent pebbles of sandstone; noncalcareous having a yellowish red (5YR 5/6) weathering rind  $\frac{1}{4}$  inch to  $\frac{1}{2}$  inch thick, interior is strong brown (7.5YR 5/6); neutral; abrupt wavy boundary. (3 to 13 inches thick)

Cr—14 to 20 inches; 75 percent strong brown (7.5YR 5/6) and 25 percent yellowish red (5YR 5/6) weathered bedrock, 75 percent strong brown (7.5YR 4/6) and 25 percent yellowish red (5YR 4/6) moist; few very fine and fine roots in cracks; neutral.

### **Range in Characteristics**

*Thickness of the mollic epipedon:* 7 inches or more

*Thickness of the solum:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches

*Content and size of coarse fragments:* 0 to 30 percent, by volume, sandstone fragments (about 0 to 10 percent are fragments less than 76 mm in diameter and 0 to 20 percent are fragments more than 76 mm in diameter)

*A and BA horizons:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam or their stony counterparts

Reaction—moderately acid to slightly alkaline

Clay content—10 to 25 percent

*Bw horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 2 to 6

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam or their stony counterparts

Reaction—moderately acid to slightly alkaline

Clay content—10 to 25 percent

*Cr horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—rippable sandstone that is interbedded with clay, siltstone, or sandy shale

Reaction—moderately acid to slightly alkaline

## ***Masham Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Shallow

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Shoulder and backslope

*Slope range:* 1 to 45 percent

*Slope shape:* Convex-linear, linear-concave, or linear-convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Clayey, mixed, active, thermic, shallow Udic Haplustepts

### **Associated Soils**

- Coyle, Grainola, and Renfrow soils which have an argillic horizon and have a solum more than 20 inches thick; commonly on slopes above the Masham soils
- Ironmound and Lucien soils which are underlain by sandstone at a depth of less than 20 inches and have less than 35 percent clay in the control section; commonly on ridgetops above the Masham soils
- Highview soils which occur over gray Permian shales; in landscape positions similar to those of the Masham soils
- Piedmont and Renthin soils which have a mollic epipedon; typically on shoulder slopes

### **Typical Pedon**

Masham silty clay loam; Payne County, Oklahoma; in rangeland, about 6 miles north and 4 miles east of Stillwater, 500 feet west and 150 feet south of the northeast corner of sec. 21, T. 20 N., R. 3 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 5 inches; reddish brown (2.5YR 4/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; strong very fine subangular blocky structure; hard, firm; many

fine roots; calcareous; moderately alkaline; gradual smooth boundary. (3 to 9 inches thick)

Bkw—5 to 16 inches; reddish brown (2.5YR 5/4) silty clay, reddish brown (2.5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, firm; few round calcium carbonate concretions 10 to 50 mm in diameter; many pressure faces; calcareous; moderately alkaline; diffuse wavy boundary. (5 to 17 inches thick)

Cr—16 to 40 inches; reddish brown (2.5YR 5/4) weathered silty shale, reddish brown (2.5YR 4/4) moist; massive; extremely hard, firm; few fine roots between shale fragments; calcareous; moderately alkaline.

### **Range in Characteristics**

*Thickness of the solum:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches

*Reaction:* Moderately alkaline throughout the profile; the A horizon is noncalcareous in some pedons

*Content and size of coarse fragments on the surface:* 0 to 75 percent, by volume, rounded fragments of limestone, sandstone, hematite, and hard pitted calcium carbonate concretions 2 to 76 mm in diameter

*A or AB horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5 (dry) and 3 or 4 (moist), and chroma of 4 to 6

Texture—silty clay loam, clay loam, silty clay, or clay

Clay content—35 to 60 percent

Content and size of coarse fragments—0 to 15 percent, by volume, rounded fragments of sandstone, ironstone, and calcium carbonate 2 to 76 mm in diameter

*Bw or Bkw horizon:*

Color—hue of 10R to 5YR, value of 4 or 5 (dry) and 3 or 4 (moist), and chroma of 3 to 6 (dry or moist)

Texture—silty clay loam, silty clay, or clay

Clay content—35 to 60 percent

Content and size of coarse fragments—1 to 5 percent, by volume, rounded calcium carbonate concretions less than 76 mm in diameter

*Cr horizon:*

Color—hue of 10R or 2.5YR, value of 3 to 5 (dry) and 3 or 4 (moist), and chroma of 2 to 6 (dry or moist)

Texture—weathered shale

## **Miller Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material and geologic age:* Material weathered from clayey alluvium of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 1 percent

*Slope shape:* Linear-linear or linear-concave

*Elevation range:* 800 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Udertic Haplustolls

### Associated Soils

- Gaddy, Pulaski, and Yahola soils which do not have a mollic epipedon and have less than 18 percent clay in the textural control section
- Ashport and Port soils which have less than 35 percent clay in the textural control section

### Typical Pedon

Miller clay; Cotton County, Oklahoma; in a cultivated area, about 4 miles west of Cookietown, 400 feet north and 500 feet east of the southwest corner of sec. 24, T. 3 S., R. 13 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; reddish brown (5YR 5/3) clay, dark reddish brown (5YR 3/3) moist; weak medium granular structure; slightly hard, friable; many fine roots; few fine and medium pores; calcareous; moderately alkaline; clear smooth boundary. (0 to 9 inches thick)

A—7 to 14 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate fine blocky structure; hard, firm; common fine roots; few fine and medium pores; calcareous; moderately alkaline; clear smooth boundary. (5 to 22 inches thick)

Bw—14 to 35 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, very firm; few fine roots; few fine pores; shiny pressure faces on faces of peds; few medium slickensides that do not intersect; common vertical cracks filled with material from above; few fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (10 to 40 inches thick)

Ab—35 to 60 inches; dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/2) moist; moderate medium blocky structure; very hard, very firm; few fine roots; few fine pores; shiny faces on faces of some peds; few fine slickensides that do not intersect; few fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 30 to more than 60 inches

*Depth to carbonates:* The profile is calcareous throughout the 10- to 40-inch control section and has soft powdery lime within a depth of 30 inches

*Other features:* Cracks more than 1 cm wide extend from the surface to a depth of about 30 inches during some season in most years

#### A horizon:

Color—hue of 5YR or 7.5YR, value of 2 to 5, and chroma of 2 or 3

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—slightly alkaline or moderately alkaline

Clay content—35 to 50 percent

#### Bw horizon:

Color—hue of 2.5 to 7.5YR, value of 3 to 5, and chroma of 2 to 6

Texture—clay, silty clay, clay loam, or silty clay loam

Reaction—slightly alkaline or moderately alkaline

Clay content—35 to 60 percent

*Ab horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6

Texture—silt loam to clay

Reaction—slightly alkaline or moderately alkaline

Clay content—25 to 50 percent

*C horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6

Texture—clay, silty clay, clay loam, silty clay loam, or silt loam

Reaction—slightly alkaline or moderately alkaline

Clay content—25 to 60 percent

## **Minco Series**

*Major land resource area:* Central Rolling Red Plains (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from loamy eolian deposits of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Primary landscape:* Valley

*Secondary landscape:* Terrace

*Landform:* Stream terrace

*Landform position:* Tread and riser

*Slope range:* 0 to 30 percent

*Slope shape:* Linear-convex, convex-linear, or linear-linear

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 190 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-silty, mixed, superactive, thermic Udic Haplustolls

### **Associated Soils**

- Grant, Norge, and Teller soils which have an argillic horizon with a clay content of more than 18 percent; in the higher positions
- Pond Creek soils which have a mollic epipedon more than 20 inches thick and have an argillic horizon with a clay content of more than 18 percent; in the higher positions
- Dougherty and Konawa soils which have an argillic horizon but do not have a mollic epipedon; in positions similar to or slightly higher than those of the Minco soils
- Reinach soils which have a mollic epipedon more than 20 inches thick; on low terraces of flood plains

### **Typical Pedon**

Minco silt loam; Grady County, Oklahoma; in a cultivated area, about 1 <sup>3</sup>/<sub>4</sub> miles north of Tuttle, 1,035 feet south and 300 feet east of the northwest corner of sec. 26, T. 10 N., R. 6 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; weak

- medium granular structure; slightly hard, very friable; many fine roots; moderately acid; abrupt smooth boundary. (0 to 10 inches thick)
- A—7 to 15 inches; brown (7.5YR 4/3) silt loam, dark brown (7.5YR 3/3) moist; moderate medium granular structure; slightly hard, very friable; many fine roots; slightly acid; gradual smooth boundary. (6 to 12 inches thick)
- Bw1—15 to 24 inches; reddish brown (5YR 5/4) silt loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure; slightly hard, friable; common fine roots; slightly alkaline; gradual smooth boundary. (8 to 14 inches thick)
- Bw2—24 to 38 inches; light reddish brown (5YR 6/4) silt loam, reddish brown (5YR 5/4) moist; moderate medium prismatic structure; slightly hard, friable; common fine roots; slightly alkaline; gradual smooth boundary. (10 to 20 inches thick)
- Bw3—38 to 55 inches; red (2.5YR 5/6) silt loam, red (2.5YR 4/6) moist; weak coarse prismatic structure; slightly hard, friable; few fine roots; moderately alkaline; gradual smooth boundary. (0 to 20 inches thick)
- C—55 to 72 inches; red (2.5YR 5/8) silt loam, red (2.5YR 4/8) moist; massive; slightly hard, friable; few fine roots; few films of secondary carbonates; calcareous; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 25 to more than 60 inches

*Depth to bedrock:* More than 72 inches

*Other features:* Clay content is 8 to 18 percent throughout the profile

#### *A and Ap horizons:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam, silt loam, or very fine sandy loam

Reaction—moderately acid to neutral

#### *Bw horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—loam, silt loam, or very fine sandy loam

Reaction—moderately acid to moderately alkaline

#### *BC horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 8

Texture—loam, silt loam, or very fine sandy loam

Reaction—slightly acid to moderately alkaline

#### *C horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—loam, silt loam, or very fine sandy loam

Reaction—slightly acid to moderately alkaline

## **Mulhall Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material formed in colluvium and underlain by silty shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Footslope



*Slope range:* 3 to 8 percent

*Slope shape:* Concave-linear

*Elevation range:* 1,000 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, siliceous, active, thermic Udic Paleustolls

### Associated Soils

- Chickasha and Zaneis soils which are on landscapes similar to those of the Mulhall soils
- Grainola soils which have a solum less than 40 inches thick, do not have a mollic epipedon, and have a fine control section; on landscapes that are slightly higher than those of the Mulhall soils
- Lucien soils which have a solum less than 20 inches thick, do not have an argillic horizon, and have mixed mineralogy; typically on ridgetops
- Renfrow soils which have a fine control section; on landscapes that are slightly higher than those of the Mulhall soils

### Typical Pedon

Mulhall loam (fig. 24); Payne County, Oklahoma; in rangeland, about 6 miles south and 3 miles west of Stillwater, 200 feet north and 1,600 feet west of the southeast corner of sec. 17, T. 18 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 13 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; slightly hard, friable; many fine roots; neutral; clear smooth boundary. (6 to 14 inches thick)

BA—13 to 17 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; weak medium granular structure; slightly hard, friable; many fine roots; slightly acid; clear smooth boundary. (4 to 14 inches thick)

Bt1—17 to 31 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm; thin nearly continuous clay films on faces of peds; common fine roots; few rounded sandstone fragments less than 3 inches in diameter; slightly acid; gradual smooth boundary. (7 to 22 inches thick)

Bt2—31 to 41 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; common fine distinct strong brown and reddish brown mottles; moderate medium prismatic structure; hard, firm; thin nearly continuous clay films on faces of peds; common fine roots; slightly acid; gradual wavy boundary. (10 to 26 inches thick)

Bt3—41 to 70 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; weak coarse prismatic structure; hard, firm; thin patchy clay films on faces of peds; few fine roots; about 10 percent of the vertical ped faces are coated with clean sand grains; many coarse prominent pinkish gray (5YR 6/2) and light reddish brown (5YR 6/3) redoximorphic concentrations; neutral; clear wavy boundary. (8 to 32 inches thick)

2Cr—70 to 80 inches; red (10R 5/6) weakly laminated silty shale, red (10R 4/6) moist; calcareous; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* More than 60 inches

*A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam or fine sandy loam



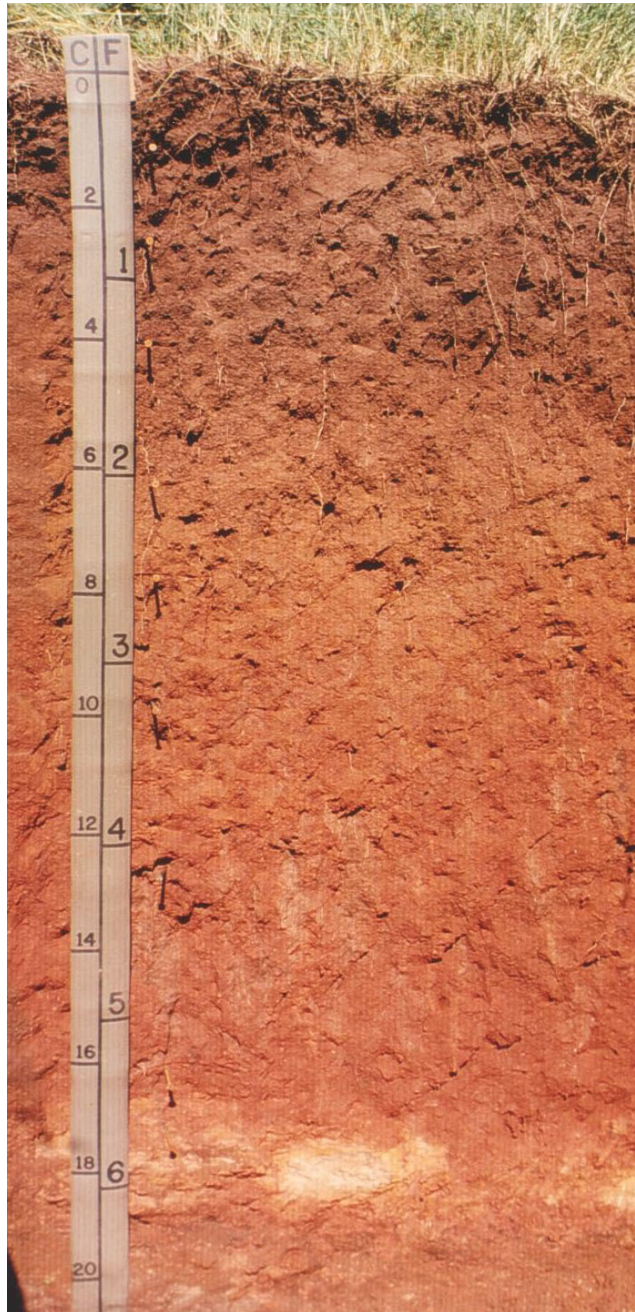


Figure 24.—Profile of Mulhall loam. Multiply the scale on the left by 10 for centimeters.

Reaction—moderately acid to slightly alkaline

Clay content—12 to 26 percent

*BA horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam, sandy clay loam, or clay loam

Reaction—slightly acid or neutral

Clay content—18 to 35 percent

*Bt1 horizon:*

Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 to 8  
Texture—clay loam or sandy clay loam  
Reaction—slightly acid to slightly alkaline  
Clay content—20 to 35 percent  
Content and size of coarse fragments—0 to 10 percent, by volume, rounded sandstone fragments less than 76 mm in diameter

*Bt2 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 4 to 8  
Texture—clay loam or sandy clay loam  
Reaction—slightly acid to moderately alkaline  
Clay content—20 to 35 percent  
Content and size of coarse fragments—0 to 10 percent, by volume, rounded sandstone fragments less than 76 mm in diameter

*Bt3 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8  
Texture—clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam  
Reaction—neutral to moderately alkaline  
Clay content—20 to 35 percent  
Redoximorphic features—red, brown, or gray concentrations and depletions  
Content and size of coarse fragments—0 to 20 percent, by volume, dark concretions less than 76 mm in diameter

*Bt4 horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8  
Texture—clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam  
Reaction—neutral to moderately alkaline  
Clay content—20 to 35 percent  
Redoximorphic features—red, brown, or gray concentrations and depletions  
Content and size of coarse fragments—0 to 20 percent, by volume, dark concretions less than 76 mm in diameter

*BC horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8  
Texture—loam or clay loam  
Reaction—neutral to moderately alkaline  
Clay content—20 to 35 percent  
Redoximorphic features—red, brown, or gray concentrations and depletions

*2Cr horizon:*

Color—red  
Texture—weakly consolidated silty shale  
Hardness—material is nonparalithic; excavation difficulty is low or moderate  
Other features—fractures more than 10 cm apart; horizon is root restrictive; horizon material slakes in water within 15 hours

***Navina Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Summit

*Slope range:* 0 to 5 percent

*Slope shape:* Linear-linear

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, mixed, active, thermic Udic Argiustolls

### **Associated Soils**

- Dougherty and Konawa soils which do not have a mollic epipedon; on landscapes that are slightly lower than those of the Navina soils
- Vanoss soils which are on landscapes that are slightly higher than those of the Navina soils
- Pond Creek soils which have a mollic epipedon more than 20 inches thick and have a fine-silty control section; on landscapes that are slightly higher than those of the Navina soils
- Teller soils which are on landscapes similar to those of the Navina soils

### **Typical Pedon**

Navina loam; Payne County, Oklahoma; in a cultivated area, about 9 miles west and 1 mile north of Perkins, 1,200 feet east and 300 feet north of the southwest corner of sec. 27, T. 18 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 10 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable; slightly acid; clear smooth boundary. (6 to 19 inches thick)

BA—10 to 14 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable; neutral; clear smooth boundary. (3 to 11 inches thick)

Bt1—14 to 24 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable; thin nearly continuous clay films on faces of peds; neutral; clear smooth boundary. (6 to 32 inches thick)

Bt2—24 to 31 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, firm; thin nearly continuous clay films on faces of peds; neutral; clear smooth boundary. (0 to 16 inches thick)

Bt3—31 to 40 inches; reddish yellow (7.5YR 6/8) fine sandy loam, strong brown (7.5YR 5/8) moist; moderate medium subangular blocky structure; slightly hard, friable; thin nearly continuous clay films on faces of peds; neutral; gradual smooth boundary. (0 to 10 inches thick)

BC—40 to 60 inches; reddish yellow (7.5YR 6/8) fine sandy loam, strong brown (7.5YR 5/8) moist; weak coarse prismatic structure; slightly hard, friable; slightly alkaline; gradual smooth boundary. (12 to 34 inches thick)

C1—60 to 75 inches; reddish yellow (7.5YR 7/6) loamy fine sand, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, friable; slightly alkaline; gradual smooth boundary.

C2—75 to 80 inches; reddish yellow (7.5YR 6/8) fine sandy loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable; slightly alkaline.

**Range in Characteristics**

*Thickness of the mollic epipedon:* Less than 20 inches

*Thickness of the solum:* 40 to 80 inches

*Depth to bedrock:* More than 72 inches

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam, loam, or fine sandy loam

Reaction—moderately acid to slightly alkaline

Clay content—8 to 26 percent

*BA horizon:*

Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam, fine sandy loam, or clay loam

Reaction—moderately acid to slightly alkaline

Clay content—10 to 35 percent

*Bt1 horizon:*

Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam, sandy clay loam, fine sandy loam, or clay loam

Reaction—moderately acid to slightly alkaline

Clay content—10 to 35 percent

*Bt2 horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6

Texture—clay loam, sandy clay loam, or fine sandy loam

Reaction—neutral or slightly alkaline

Clay content—10 to 35 percent

Redoximorphic features—brown, yellow, or red concentrations

*Bt3 horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6

Texture—fine sandy loam, clay loam, or sandy clay loam

Reaction—neutral or slightly alkaline

Clay content—10 to 35 percent

Redoximorphic features—brown, yellow, or red concentrations

*BC horizon:*

Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 4 to 8

Texture—loam, fine sandy loam, or sandy clay loam

Reaction—neutral or slightly alkaline

Clay content—10 to 35 percent

Redoximorphic features—brown, yellow, or red concentrations

*C horizon:*

Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 4 to 8

Texture—fine sandy loam, loam, or loamy fine sand

Reaction—neutral or slightly alkaline

Clay content—2 to 15 percent

Redoximorphic features—brown, yellow, or red concentrations

***Newalla Series***

*Major land resource area:* Northern Cross Timbers (84A)

*Depth class:* Deep

*Drainage class:* Moderately well drained

*Parent material and geologic age:* Material weathered from shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Backslope

*Slope range:* 1 to 25 percent

*Slope shape:* Convex-convex or linear-convex

*Elevation range:* 800 to 1,200 feet

*Mean annual precipitation:* 30 to 40 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy over clayey, siliceous, superactive, thermic Udic  
Haplustalfs

### Associated Soils

- Darnell and Darsil soils which do not have an argillic horizon and are less than 20 inches thick over sandstone; mainly on ridge crests
- Grainola soils which are on side slopes of prairie uplands
- Littleaxe soils which have a fine-loamy control section; on ridge crests
- Harrah soils which have a fine-loamy control section and have a solum more than 72 inches thick; on the lower footslopes and side slopes
- Stephenville soils which have a fine-loamy control section and have a solum that is 20 to 40 inches thick over sandstone; on landscapes similar to those of the Newalla soils
- Renfrow soils which have a solum more than 60 inches thick; on the higher prairie uplands

### Typical Pedon

Newalla fine sandy loam; Cleveland County, Oklahoma; on a 7 percent slightly convex southeast-facing upland side slope, in a savannah of post oak and blackjack oak, about 1 mile south and 7.4 miles east of Slaughterville, 1,900 feet east and 150 feet south of the northwest corner of sec. 21, T. 7 N., R. 1 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 3 inches; brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable; many very fine and fine and common medium roots; strongly acid; clear smooth boundary. (2 to 9 inches thick)
- E—3 to 6 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak medium granular structure; slightly hard, very friable; many very fine and fine and common medium roots; very strongly acid; abrupt wavy boundary. (0 to 7 inches thick)
- Bt—6 to 10 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm; common very fine, fine, and medium and few coarse roots; patchy clay films on faces of peds; many faces of peds coated with light brown (7.5YR 6/4) fine sandy loam; very strongly acid; clear wavy boundary. (3 to 15 inches thick)
- 2Bt—10 to 16 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; moderate fine and medium blocky structure; very hard, very firm; common very fine and fine and few medium and coarse roots; nearly continuous clay films on faces of peds; very strongly acid; gradual wavy boundary. (4 to 23 inches thick)
- 2Btss—16 to 30 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; extremely hard, extremely firm; common



- very fine and fine and few medium and coarse roots; few nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; moderately acid; gradual wavy boundary. (0 to 26 inches thick)
- 2Btkss—30 to 42 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky and blocky structure; extremely hard, extremely firm; few very fine, fine, medium, and coarse roots; few nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; common fine and medium soft masses of calcium carbonate; slight effervescence; slightly alkaline; gradual wavy boundary. (0 to 28 inches thick)
- 2B'tss—42 to 51 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium and coarse blocky structure; extremely hard, extremely firm; few very fine and fine roots; common nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; slight effervescence; moderately alkaline; gradual wavy boundary.
- 2BC—51 to 58 inches; red (2.5YR 4/6) gravelly silty clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; very hard, very firm; few very fine roots; patchy clay films on faces of peds; common fine distinct yellowish red (5YR 4/6) redoximorphic features; 25 percent, by volume, shale fragments 2 to 76 mm in diameter; slight effervescence; slightly alkaline; clear wavy boundary. (0 to 18 inches thick)
- 2Cr—58 to 80 inches; red (2.5YR 4/6) weakly laminated, soft shale; slightly alkaline.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to bedrock:* 40 to 60 inches

#### *A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6

Texture—typically fine sandy loam; loam or sandy clay loam in some eroded pedons

Reaction—strongly acid to neutral

Clay content—7 to 25 percent

#### *E horizon:*

Color—hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 6

Texture—fine sandy loam

Reaction—very strongly acid to neutral

Clay content—7 to 17 percent

#### *Bt horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 3 to 8

Texture—sandy clay loam or clay loam

Reaction—very strongly acid to neutral

Clay content—20 to 35 percent

#### *2Bt and 2Btss horizons:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—silty clay or clay

Reaction—very strongly acid to moderately alkaline

Clay content—40 to 60 percent

Redoximorphic features (in some pedons)—red, yellow, or brown concentrations

#### *2Btkss and 2B'tss horizons:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—clay or silty clay

Reaction—neutral to moderately alkaline

Clay content—40 to 60 percent

Redoximorphic features (in some pedons)—red, yellow, or brown concentrations

*2BC or 2BCK horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—sandy clay, silty clay, gravelly silty clay, or very gravelly silty clay

Reaction—slightly alkaline or moderately alkaline

Clay content—40 to 60 percent

Redoximorphic features (in some pedons)—red, yellow, or brown concentrations

Other features—0 to 10 percent, by volume, soft accumulations of calcium carbonate

*2Cr horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 2 to 6

Reaction—slightly alkaline or moderately alkaline

## **Norge Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvium of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Tread and riser

*Slope range:* 0 to 8 percent

*Slope shape:* Linear-linear/convex

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-silty, mixed, active, thermic Udic Paleustolls

### **Associated Soils**

- Bethany soils which have a fine control section; on the same landscapes as the Norge soils or higher
- Grant soils which decrease in clay content by more than 20 percent within a depth of 60 inches and have a solum that is less than 60 inches thick; on side slopes of nearby landscapes
- Navina, Teller, and Vanoss soils which decrease in clay content by more than 20 percent within a depth of 60 inches; on the lower terraces or on the same terrace as the Norge soils but nearer to the stream
- Pond Creek soils which have a mollic epipedon that is more than 20 inches thick and decrease in clay content within a depth of 60 inches; on the lower terraces or on the same terrace as the Norge soils but nearer to the stream

### **Typical Pedon**

Norge silt loam; Pawnee County, Oklahoma; in a cultivated area, about 8 miles northeast of Pawnee, 725 feet east and 150 feet south of the northwest corner of sec. 9, T. 22 N., R. 6 E. (Colors are for dry soil unless otherwise stated.)

- A—0 to 12 inches; dark brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, friable; many fine roots; moderately acid; gradual smooth boundary. (6 to 16 inches thick)
- BA—12 to 18 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; hard, friable; many fine roots; moderately acid; gradual smooth boundary. (0 to 10 inches thick)
- Bt1—18 to 36 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; very hard, firm; common fine roots; nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (9 to 25 inches thick)
- Bt2—36 to 48 inches; red (2.5YR 5/6) silty clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm; common fine roots; continuous clay films on faces of peds; slightly acid; gradual smooth boundary. (9 to 37 inches thick)
- Bt3—48 to 66 inches; red (2.5YR 5/8) silty clay loam, red (2.5YR 4/8) moist; weak coarse subangular blocky structure; hard, firm; few fine roots; discontinuous clay films on faces of peds; slightly acid.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 20 inches

*Thickness of the solum:* More than 60 inches

*Depth to carbonates:* More than 40 inches

##### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam, loam, silty clay loam, or clay loam

Reaction—moderately acid to neutral

Clay content—15 to 35 percent

##### *BA horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, loam, silty clay loam, or clay loam

Reaction—moderately acid to neutral

Clay content—18 to 35 percent

##### *Bt1 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6

Texture—silty clay loam or clay loam

Reaction—moderately acid to slightly alkaline

Clay content—27 to 35 percent

##### *Bt2 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6

Texture—silty clay loam or clay loam

Reaction—moderately acid to slightly alkaline

Clay content—27 to 35 percent

##### *Bt3 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Redoximorphic features (in some pedons)—concentrations and depletions in shades of gray, yellow, or brown

Texture—silty clay loam, silty clay, or clay loam

Reaction—slightly acid to moderately alkaline

Clay content—27 to 50 percent

##### *Bt4 horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8



Redoximorphic features (in some pedons)—concentrations and depletions in shades of gray, yellow, or brown

Texture—silty clay loam, clay loam, or silty clay

Reaction—slightly acid to slightly alkaline

*BC horizon (if it occurs):*

Color—similar to the Bt4 horizon

Texture—similar to the Bt4 horizon

Reaction—neutral to moderately alkaline

## ***Piedmont Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from clayey and silty shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Shoulder and backslope

*Slope range:* 1 to 5 percent

*Slope shape:* Linear-convex or linear-linear

*Elevation range:* 700 to 1,600 feet

*Mean annual precipitation:* 28 to 38 inches

*Mean annual air temperature:* 59 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Udertic Argiustolls

### **Associated Soils**

- Renthin soils which are 40 to 60 inches deep; on landscapes similar to those of the Piedmont soils but at the higher elevations
- Bethany and Kirkland soils which have a mollic epipedon more than 20 inches thick and have an argillic horizon that does not decrease in clay content from the maximum by more than 20 percent at a depth of 60 inches; in the higher positions
- Renfrow soils which have an argillic horizon that does not decrease in clay content from the maximum by more than 20 percent at a depth of 60 inches; in the higher positions
- Norge soils which have a fine-silty control section, have a solum more than 60 inches thick, and have an argillic horizon that does not decrease in clay content from the maximum by more than 20 percent at a depth of 60 inches; in the lower positions
- Grainola soils which do not have a mollic epipedon and are calcareous; in the lower positions
- Kingfisher soils which have a fine-silty control section; in landscape positions similar to those of the Piedmont soils
- Grant soils which have a solum that is 40 to 60 inches thick and have a fine-silty control section; on landscapes similar to those of the Piedmont soils
- Huska soils which do not have a mollic epipedon and have a natric horizon; on landscapes similar to those of the Piedmont soils
- Lucien soils which have a solum that is 10 to 20 inches thick and have a loamy control section; on landscapes similar to those of the Piedmont soils

- Zaneis soils which have a fine-loamy control section, have a solum that is 40 to 60 inches thick, and do not have secondary calcium carbonate accumulations; in the higher positions

### Typical Pedon

Piedmont silt loam; Oklahoma County, Oklahoma; in bermudagrass pasture, about 8 miles west and 3 <sup>3</sup>/<sub>4</sub> miles north of Edmond, about 1,300 feet south and 2,000 feet west of the northeast corner of sec. 9, T. 14 N., R. 4 W. (Colors are for dry soil unless otherwise stated.)

- Ap—0 to 4 inches; brown (7.5YR 5/3) silt loam, dark brown (7.5YR 3/3) moist; moderate fine and medium platy structure parting to weak very fine granular; hard, friable; many very fine and fine roots; common very fine and fine pores; moderately acid; clear smooth boundary. (3 to 9 inches thick)
- BA—4 to 8 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure parting to weak fine subangular blocky; hard, friable; many very fine and fine roots; many very fine and fine pores; light brown (7.5YR 6/3) silt coatings on faces of peds; slightly acid; clear smooth boundary. (0 to 4 inches thick)
- Btss—8 to 16 inches; reddish brown (5YR 4/3) silty clay, dark reddish brown (5YR 3/3) moist; moderate medium prismatic structure parting to moderate medium blocky; extremely hard, extremely firm; common very fine and fine roots; many very fine and common fine pores; common nonintersecting slickensides; continuous clay films on vertical and horizontal faces; common pressure faces; neutral; gradual wavy boundary. (5 to 17 inches thick)
- Btkss1—16 to 21 inches; reddish brown (5YR 5/3) silty clay, reddish brown (5YR 4/3) moist; weak medium prismatic structure parting to moderate medium blocky; extremely hard, extremely firm; common very fine and fine roots; common very fine and fine pores; common slickensides; continuous clay films on vertical and horizontal faces; common pressure faces; few fine and medium calcium carbonate concretions; moderately alkaline; gradual wavy boundary. (0 to 17 inches thick)
- Btkss2—21 to 30 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium blocky; extremely hard, extremely firm; common very fine and few fine roots; common very fine and fine pores; few slickensides; patchy clay films on faces of peds; common coarse soft masses of calcium carbonate; few fine and medium calcium carbonate concretions; violently effervescent; moderately alkaline; gradual wavy boundary. (0 to 14 inches thick)
- Bck—30 to 35 inches; yellowish red (5YR 5/6) silty clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; very hard, very firm; few very fine and fine roots; common very fine and fine pores; common fine threads and medium soft masses of calcium carbonate; few black stains on faces of peds; 10 to 14 percent, by volume, red (2.5YR 5/6 and 5/8) soft shale fragments; violently effervescent; moderately alkaline; clear wavy boundary. (0 to 5 inches thick)
- Cr1—35 to 52 inches; red (2.5YR 5/6) clayey and silty soft shale, red (2.5YR 4/6) moist; few very fine and fine roots in fractures; strongly effervescent; moderately alkaline; gradual wavy boundary. (12 to 17 inches thick)
- Cr2—52 to 59 inches; red (2.5YR 5/6) laminated siltstone, red (2.5YR 4/6) moist; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

*Depth to carbonates:* 10 to 30 inches

*Other features:* Cracks within 125 cm of the mineral soil surface that are 5 mm or more wide and extend through a thickness of 30 cm or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 cm or more thick that has its upper boundary within 125 cm of the mineral soil surface; linear extensibility of 6.0 cm or more between the mineral soil surface and either a depth of 100 cm or a paralithic contact

*A or Ap horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 or 3  
Texture—silty loam, silty clay loam, or clay loam  
Reaction—moderately acid to neutral  
Clay content—18 to 40 percent

*BA horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4  
Texture—silty clay loam or clay loam  
Reaction—moderately acid to slightly alkaline  
Clay content—27 to 40 percent

*Btss horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6  
Texture—silty clay loam, silty clay, or clay  
Reaction—neutral to moderately alkaline  
Clay content—35 to 55 percent

*Btkss1 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6  
Texture—silty clay loam, silty clay, or clay  
Reaction—moderately alkaline  
Clay content—35 to 55 percent

*Btkss2 horizon:*

Color—hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 4 to 8  
Texture—silty clay loam, silty clay, or clay  
Reaction—moderately alkaline  
Clay content—35 to 55 percent

*BCK horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8  
Texture—silty clay loam, silty clay, or clay  
Reaction—moderately alkaline

*Cr horizon:*

Color—hue of 2.5YR, value of 4 to 6, and chroma of 6 to 8

## ***Pulaski Series***

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy alluvial sediments of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 3 percent

*Slope shape:* Linear-linear

*Elevation range:* 700 to 1,300 feet

*Mean annual precipitation:* 30 to 40 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thornthwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-loamy, mixed, superactive, nonacid, thermic Udic  
Ustifluvents

### **Associated Soils**

- Cyril soils which have a mollic epipedon
- Gaddy soils which typically are on flood plains nearer to the stream channel of the larger streams
- Gracemont soils which have an apparent water table within a depth of 20 to 40 inches and are calcareous throughout; typically on flood plains nearer to the stream channel of the larger streams
- Gracemore soils which have an apparent water table within a depth of 20 to 40 inches, are calcareous throughout, and have a sandy control section; typically on flood plains nearer to the stream channel of the larger streams
- Ashport and Port soils which have a mollic epipedon and a fine-silty textural control section; at the slightly higher elevations
- Easpor soils which have a mollic epipedon and a fine-loamy textural control section; at the slightly higher elevations

### **Typical Pedon**

Pulaski fine sandy loam; Lincoln County, Oklahoma; in a cultivated area, about 6 miles north and 1 mile east of Chandler, 1,135 feet north and 200 feet east of the southwest corner of sec. 2, T. 15 N., R. 4 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; soft, very friable; moderately acid; clear smooth boundary. (6 to 12 inches thick)

A—7 to 19 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; slightly hard, very friable; moderately acid; gradual smooth boundary. (4 to 20 inches thick)

C1—19 to 40 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few thin strata of darker fine sandy loam in the lower part of horizon; slightly acid; gradual smooth boundary. (16 to 36 inches thick)

C2—40 to 64 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable; common thin strata of loamy fine sand; slightly acid.

### **Range in Characteristics**

*Depth to bedrock:* More than 72 inches

*Depth to carbonates:* More than 40 inches

*Depth to buried horizons:* More than 30 inches

*A horizon:*

Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 6

Texture—fine sandy loam, loam, or loamy fine sand

Reaction—moderately acid to slightly alkaline

Clay content—5 to 18 percent

*C horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 3 to 8

Texture—stratified loamy fine sand, fine sandy loam, very fine sandy loam, or loam  
 Reaction—moderately acid to slightly alkaline  
 Clay content—5 to 18 percent

## ***Renfrow Series***

*Major land resource area:* Central Rolling Red Prairies (80A)  
*Depth class:* Very deep  
*Drainage class:* Well drained  
*Parent material and geologic age:* Clayey shale of Permian age  
*Physiographic region:* Interior Lowlands  
*Physiographic province:* Central Lowland  
*Physiographic sub-province:* Osage Plain  
*Landscape:* Upland  
*Landform:* Hills  
*Landform position:* Summit and backslope  
*Slope range:* 0 to 5 percent  
*Slope shape:* Linear-linear or convex  
*Elevation range:* 900 to 1,500 feet  
*Mean annual precipitation:* 26 to 40 inches  
*Mean annual air temperature:* 58 to 64 degrees F  
*Frost-free days:* 190 to 230  
*Thorntwaite PE index:* 44 to 64  
*Taxonomic class:* Fine, mixed, superactive, thermic Udertic Paleustolls

### **Associated Soils**

- Bethany and Kirkland soils which are on the higher parts of the landscape
- Tabler soils which have a mollic epipedon more than 20 inches thick; on the higher parts of the landscape
- Piedmont and Renthin soils which have a solum less than 60 inches thick; typically on shoulder slopes
- Grainola and Masham soils which do not have a mollic epipedon and have a solum less than 60 inches thick; typically on backslopes
- Kingfisher soils which have a fine-silty control section; on the same landscapes as the Renfrow soils
- Stoneburg and Zaneis soils which have a fine-loamy control section; on the same landscapes as the Renfrow soils

### **Typical Pedon**

Renfrow silt loam; Kay County, Oklahoma; in native range, about 4 miles south and 3 miles west of Tonkawa, 2,200 feet south and 50 feet east of the northwest corner of sec. 25, T. 25 N., R. 2 W. (Colors are for dry soil unless otherwise stated.)

- A—0 to 9 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; hard, friable; many fine roots; slightly acid; gradual smooth boundary. (5 to 12 inches thick)
- BA—9 to 13 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, friable; many fine roots; slightly acid; clear smooth boundary. (3 to 10 inches thick)
- Btss1—13 to 25 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, very firm; nearly continuous clay films on faces of peds; few slickensides; common fine roots; neutral; gradual smooth boundary. (8 to 20 inches thick)
- Btss2—25 to 40 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR

3/4) moist; moderate coarse blocky structure; extremely hard, very firm; nearly continuous clay films on faces of peds; common slickensides; few fine roots; calcareous at a depth of 30 inches; slightly alkaline; gradual smooth boundary. (8 to 25 inches thick)

Btss3—40 to 65 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak coarse blocky structure; extremely hard, very firm; patchy clay films on faces of peds; few slickensides; few fine roots; few fine and medium concretions of calcium carbonate; few fine soft rounded bodies of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (0 to 33 inches thick)

C—65 to 75 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; massive; extremely hard, very firm; calcareous; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 20 inches

*Thickness of the solum:* More than 60 inches

*Depth to carbonates:* 20 to 50 inches

*Depth to bedrock:* More than 80 inches

*Other features:* Cracks within 125 cm of the mineral soil surface that are 5 mm or more wide and extend through a thickness of 30 cm or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 cm or more thick that has its upper boundary within 125 cm of the mineral soil surface; linear extensibility of 6.0 cm or more between the mineral soil surface and a depth of 100 cm

#### *A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam, silty clay loam, clay loam, or loam

Reaction—moderately acid to slightly alkaline

Clay content—18 to 35 percent

#### *BA horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam, clay loam, or silt loam

Reaction—slightly acid to slightly alkaline

Clay content—22 to 40 percent

#### *Btss1 horizon:*

Color—hue of 2.5YR to 5YR, value of 4 to 6, and chroma of 3 to 6

Texture—clay, silty clay, silty clay loam, or clay loam

Reaction—slightly acid to moderately alkaline

Clay content—35 to 55 percent

#### *Btss2 horizon:*

Color—hue of 2.5YR to 5YR, value of 4 to 6, and chroma of 3 to 6

Texture—clay, silty clay, silty clay loam, or clay loam

Reaction—slightly acid to moderately alkaline

Clay content—35 to 55 percent

#### *Btss3 horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 3 to 8

Texture—clay, silty clay, silty clay loam, or clay loam

Reaction—neutral to moderately alkaline

Clay content—35 to 55 percent

#### *BC horizon (if it occurs):*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 3 to 8

Texture—clay, silty clay, silty clay loam, or clay loam



Reaction—moderately alkaline; horizon is calcareous  
 Clay content—35 to 55 percent  
 Content and size of coarse fragments—0 to 15 percent, by volume, shale gravel 2 to 25 mm in diameter

*C horizon:*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 6 to 8  
 Texture—clay, silty clay, silty clay loam, or clay loam  
 Reaction—moderately alkaline; horizon is calcareous  
 Clay content—35 to 55 percent  
 Content and size of coarse fragments—0 to 15 percent, by volume, shale gravel 2 to 25 mm in diameter  
 Redoximorphic features (in some pedons)—redoximorphic accumulations and depletions in shades of brown, red, or gray

*Cr horizon (if it occurs):*

Texture—consolidated shale  
 Depth—more than 60 inches

## ***Renthin Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from clayey and silty shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 5 percent

*Slope shape:* Linear-convex or linear-linear

*Elevation range:* 800 to 1,600 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 190 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine, mixed, superactive, thermic Udertic Argiustolls

### **Associated Soils**

- Renfrow soils which have a solum more than 60 inches thick; in the higher positions
- Norge soils which have an argillic horizon that does not decrease in clay content by more than 20 percent at a depth of 60 inches and which have a fine-silty control section; in the lower positions
- Bethany and Kirkland soils which have a mollic epipedon more than 20 inches thick; in the higher positions
- Grainola soils which do not have a mollic epipedon
- Kingfisher soils which have a fine-silty control section
- Grant soils which have a fine-silty control section; on landscapes similar to those of the Renthin soils
- Huska soils which do not have a mollic epipedon and have a natric horizon; on landscapes similar to those of the Renthin soils

- Lucien soils which have a solum 10 to 20 inches thick and have a loamy control section; in the lower positions
- Piedmont soils which are on landscapes similar to those of the Renthin soils but are at the lower elevations near drainage channels
- Zaneis soils which have a fine-loamy control section and do not have secondary calcium carbonate accumulations; on landscapes similar to those of the Renthin soils

### Typical Pedon

Renthin silt loam; Oklahoma County, Oklahoma; in a native hay meadow, about 2 miles east and 1/2 mile north of Britton, about 2,500 feet north and 1,500 feet east of the southwest corner of sec. 26, T. 13 N., R. 3 W. (Colors are for dry soil unless otherwise stated.)

- A—0 to 4 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to weak fine granular; hard, friable; many very fine and few fine roots; many very fine and fine pores; neutral; clear smooth boundary. (4 to 10 inches thick)
- BA—4 to 10 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; very hard, firm; many very fine and few fine roots; many very fine and fine pores; common wormcasts; slightly acid; clear smooth boundary. (0 to 6 inches thick)
- Bt1—10 to 15 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; very hard, very firm; many very fine and few fine roots; common very fine and fine pores; common distinct discontinuous clay films on vertical faces of peds; slightly acid; gradual smooth boundary. (4 to 20 inches thick)
- Bt2—15 to 22 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate medium prismatic structure parting to moderate medium blocky; extremely hard, extremely firm; many very fine and few fine roots; many very fine and common fine pores; common distinct continuous clay films on vertical and horizontal faces of peds; vertical cracks filled with material from A horizon; slightly acid; clear wavy boundary. (0 to 20 inches thick)
- Btss—22 to 29 inches; red (2.5YR 4/6) clay, red (2.5YR 3/6) moist; moderate medium prismatic structure parting to strong medium blocky; extremely hard, extremely firm; common very fine and few fine roots; few very fine and fine pores; common slickensides; common distinct continuous clay films on vertical and horizontal faces of peds; neutral; gradual wavy boundary. (0 to 20 inches thick)
- Btkss—29 to 42 inches; red (2.5YR 4/6) clay, red (2.5YR 3/6) moist; weak coarse prismatic structure parting to strong medium blocky; extremely hard, extremely firm; common very fine roots; few very fine and fine pores; common slickensides; common distinct continuous clay films on vertical and horizontal faces of peds (30 percent, by volume); common calcium carbonate masses; few fine and medium calcium carbonate concretions; few fine and medium black concretions (2 percent, by volume); slightly alkaline; gradual wavy boundary. (6 to 38 inches thick)
- Btk—42 to 55 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; weak coarse prismatic structure parting to moderate medium blocky; very hard, very firm; few very fine roots; common very fine and few fine pores; few distinct continuous clay films on vertical faces of peds; few medium calcium carbonate soft masses; few medium calcium carbonate concretions; fine and medium black concretions (10 percent, by volume); moderately alkaline; clear wavy boundary. (6 to 38 inches thick)
- Cr1—55 to 66 inches; reddish brown (2.5YR 4/4), red (2.5YR 5/6), and pale yellow (2.5Y 7/4) laminated shale, sandstone, and siltstone, dark reddish brown (2.5YR 3/4), red (2.5YR 4/6), and light yellowish brown (2.5Y 6/4) moist; hard; very few



very fine roots in fractures; strongly alkaline; clear wavy boundary. (0 to 11 inches thick)

Cr2—66 to 77 inches; red (2.5YR 5/6) and light gray (2.5Y 7/2) very fine-grained sandstone, red (2.5YR 4/6) and light brownish gray (2.5Y 6/2) moist; hard; strongly alkaline.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to bedrock:* 40 to 60 inches

*Depth to carbonates:* 19 to 52 inches

*Other features:* Cracks within 125 cm of the mineral soil surface that are 5 mm or more wide and extend through a thickness of 30 cm or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 cm or more thick that has its upper boundary within 125 cm of the mineral soil surface; linear extensibility of 6.0 cm or more between the mineral soil surface and either a depth of 100 cm or a paralithic contact; clay content of more than 35 percent within a depth of 15 inches

#### *A horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3

Texture—typically silt loam; commonly silty clay loam or clay loam in cultivated areas

Reaction—slightly acid to neutral

Clay content—20 to 35 percent

#### *BA horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam or clay loam

Reaction—slightly acid to slightly alkaline

Clay content—32 to 40 percent

#### *Bt1 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay loam, silty clay, or clay

Reaction—slightly acid to moderately alkaline

Clay content—35 to 45 percent

#### *Bt2 horizon:*

Color—hue of 2.5YR or 5YR and value and chroma of 4 to 6

Texture—silty clay or clay

Reaction—slightly acid to moderately alkaline

Clay content—40 to 55 percent

#### *Btss horizon:*

Color—hue of 2.5YR or 5YR and value and chroma of 4 to 6

Texture—silty clay or clay

Reaction—slightly acid to moderately alkaline

Clay content—40 to 55 percent

#### *Btkss horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Texture—silty clay loam, silty clay, or clay

Reaction—slightly alkaline or moderately alkaline

Clay content—35 to 55 percent

#### *Btk horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Texture—silty clay loam, clay loam, silty clay, or clay

Reaction—moderately alkaline

Clay content—35 to 55 percent

*BC horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Texture—silty clay loam, clay loam, silty clay, or clay

Reaction—moderately alkaline

Clay content—35 to 55 percent

*Cr horizon:*

Color—hue of 2.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—nonparalithic shale

Excavation difficulty—low or moderate

Other features—fractures more than 10 cm apart; most of horizon material slakes in water within 15 hours

## ***Slaughterville Series***

*Major land resource area:* Central Rolling Red Plains (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy and sandy eolian deposits of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Primary landscape:* Valley

*Secondary landscape:* Terrace

*Landform:* Dune

*Landform position:* Interdune

*Slope range:* 1 to 45 percent

*Slope shape:* Linear-convex or convex-convex

*Elevation range:* 800 to 1,200 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-loamy, mixed, superactive, thermic Udic Haplustolls

### **Associated Soils**

- Canadian soils which are on nearly level and very gently sloping flood plains that are subject to rare flooding
- Derby soils which have a sandy control section with lamellae; on landscapes similar to those of the Slaughterville soils
- Konawa soils which have lighter colored A horizons than the Slaughterville soils and a fine-loamy control section; on the higher landscapes that are farther from the stream
- Dougherty soils which have A horizons more than 20 inches thick, have lighter colored A horizons than the Slaughterville soils, and have a fine-loamy control section; on the higher landscapes that are farther from the stream
- Minco soils which typically are in the slightly higher and flatter adjacent areas
- Norge, Teller, and Vanoss soils which have argillic horizons; on landscapes that are similar to those of the Slaughterville soils but are farther from the stream

### Typical Pedon

Slaughterville fine sandy loam; Cleveland County, Oklahoma; in pastureland, about 6 miles west and 6 miles north of Norman, about 2,040 feet east and 580 feet north of the southwest corner of sec. 29, T. 10 N., R. 3 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 9 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many very fine and few medium roots; slightly acid; clear smooth boundary. (7 to 11 inches thick)

A—9 to 18 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, very friable; many very fine roots; slightly acid; gradual smooth boundary. (3 to 10 inches thick)

Bw—18 to 30 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable; many very fine roots; neutral; gradual smooth boundary. (10 to 56 inches thick)

C1—30 to 58 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; soft, very friable; common very fine roots; slightly alkaline; gradual smooth boundary. (8 to 48 inches thick)

C2—58 to 76 inches; yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, very friable; few very fine roots; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to more than 50 inches

#### *A and Ap horizons:*

Color—hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—fine sandy loam

Reaction—moderately acid to neutral

#### *Bw horizon:*

Color—hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 6

Texture—fine sandy loam

Reaction—slightly acid to moderately alkaline

Clay content—10 to 18 percent

#### *C horizon:*

Color—hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 4 to 6

Texture—typically fine sandy loam; loamy fine sand or fine sand occurs below a depth of 45 inches in some pedons

Reaction—neutral to moderately alkaline

## Stephenville Series

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Parent material and geologic age:* Sandstone of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 1 to 25 percent

*Slope shape:* Linear-convex

*Elevation range:* 700 to 1,500 feet

*Mean annual precipitation:* 30 to 38 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Fine-loamy, siliceous, active, thermic Ultic Haplustalfs

### **Associated Soils**

- Littleaxe, Dougherty, Galey, Harrah, Konawa, and Stidham soils which are on landscapes similar to those of the Stephenville soils
- Darnell and Darsil soils which have a solum less than 20 inches thick and do not have Bt horizons; on ridgetops
- Niotaze soils which have a fine control section; on side slopes, commonly at the lower elevations

### **Typical Pedon**

Stephenville loamy fine sand; Oklahoma County, Oklahoma; in bermudagrass pasture, about 2 1/2 miles east and 1 mile north of Spencer, about 750 feet south and 450 feet east of the northwest corner of sec. 8, T. 12 N., R. 1 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable; many very fine and fine and few medium and coarse roots; moderately acid; clear smooth boundary. (3 to 8 inches thick)

E—5 to 15 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; common very fine and fine and few medium roots; strongly acid; abrupt wavy boundary. (0 to 13 inches thick)

Bt1—15 to 25 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm; common very fine and fine and few medium roots; common distinct continuous clay films on faces of peds; clean sand grains along root channels; strongly acid; gradual wavy boundary. (5 to 25 inches thick)

Bt2—25 to 33 inches; light red (2.5YR 6/6) sandy clay loam, red (2.5YR 5/6) moist; weak coarse subangular blocky structure; hard, firm; few very fine and medium, common fine, and very few coarse roots; common distinct patchy clay films on faces of peds; clean sand grains along root channels; strongly acid; clear wavy boundary. (0 to 12 inches thick)

Cr1—33 to 40 inches; red (2.5YR 5/6) weakly cemented fine-grained sandstone, red (2.5YR 4/6) moist; hard; common fine and few medium roots in fractures; strongly acid; clear wavy boundary.

Cr2—40 to 51 inches; light red (2.5YR 6/8) weakly cemented fine-grained sandstone, red (2.5YR 5/8) moist; hard; common fine and few medium roots in fractures; strongly acid.

### **Range in Characteristics**

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

*A horizon:*

Color—hue of 5YR to 10YR, value of 3 to 7, and chroma of 2 to 6

Texture—fine sandy loam or loamy fine sand

Reaction—strongly acid to slightly acid

Clay content—5 to 20 percent

*E horizon:*

Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 2 to 6  
 Texture—fine sandy loam or loamy fine sand  
 Reaction—strongly acid to slightly acid  
 Clay content—5 to 20 percent

*Bt horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—sandy clay loam or fine sandy loam  
 Reaction—very strongly acid to slightly acid  
 Clay content—18 to 35 percent

*BC horizon (if it occurs):*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8  
 Texture—fine sandy loam or sandy clay loam  
 Reaction—strongly acid to slightly acid  
 Clay content—18 to 35 percent

*Cr horizon:*

Color—reddish  
 Texture—sandstone

***Teller Series***

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Loamy sediments of Pleistocene age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Terrace

*Landform position:* Tread or summit

*Slope range:* 0 to 8 percent

*Slope shape:* Linear-convex, linear-linear, or convex-linear

*Elevation range:* 900 to 1,300 feet

*Mean annual precipitation:* 26 to 38 inches

*Mean annual air temperature:* 58 to 63 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, mixed, active, thermic Udic Argiustolls

**Associated Soils**

- Dougherty and Konawa soils which do not have a mollic epipedon; in the slightly higher positions
- Minco soils which do not have an argillic horizon; in the higher positions or in areas between terraces
- Norge, Pond Creek, and Vanoss soils which have fine-silty control sections; in the slightly lower positions
- Navina soils which are in landscape positions similar to those of the Teller soils
- Slaughterville soils which do not have an argillic horizon; in the slightly lower positions nearer the major streams

### Typical Pedon

Teller fine sandy loam; Payne County, Oklahoma; in a cultivated area, about 1 mile west and 1 mile north of Perkins, 2,100 feet north and 80 feet east of the southwest corner of sec. 36, T. 18 N., R. 2 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; slightly hard, very friable; moderately acid; clear smooth boundary. (0 to 11 inches thick)

A—6 to 15 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium and fine granular structure; slightly hard, friable; moderately acid; gradual smooth boundary. (6 to 15 inches thick)

BA—15 to 20 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, friable; moderately acid; gradual smooth boundary. (0 to 8 inches thick)

Bt1—20 to 32 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; thin nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (6 to 20 inches thick)

Bt2—32 to 42 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm; patchy clay films on faces of peds; moderately acid; gradual smooth boundary. (6 to 20 inches thick)

Bt3—42 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; patchy clay films on faces of peds; moderately acid; diffuse smooth boundary. (10 to 30 inches thick)

C—60 to 70 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; patchy clay films on faces of peds; moderately acid.

### Range in Characteristics

*Thickness of the mollic epipedon:* Less than 20 inches

*Thickness of the solum:* More than 50 inches

*Depth to bedrock:* More than 60 inches

#### *Ap or A horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—fine sandy loam, loam, or very fine sandy loam

Reaction—moderately acid or slightly acid

Clay content—10 to 20 percent

#### *BA horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—fine sandy loam, loam, or very fine sandy loam

Reaction—moderately acid or slightly acid

Clay content—18 to 30 percent

#### *Bt1 and Bt2 horizons:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—sandy clay loam or clay loam

Reaction—moderately acid to neutral

Clay content—20 to 30 percent

#### *Bt3 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—fine sandy loam, loam, clay loam, or very fine sandy loam

Reaction—moderately acid to neutral

Clay content—10 to 20 percent

*BC horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—loam, fine sandy loam, or very fine sandy loam

Reaction—slightly acid to slightly alkaline

Clay content—10 to 20 percent

*C horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture—loam, fine sandy loam, or very fine sandy loam

Reaction—moderately acid to slightly alkaline

Clay content—10 to 20 percent

## ***Tribbey Series***

*Major land resource area:* Cross Timbers (84A)

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material and geologic age:* Loamy and sandy alluvium of Recent age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 2 percent

*Slope shape:* Concave-concave or linear-concave

*Elevation range:* 800 to 1,200 feet

*Mean annual precipitation:* 30 to 40 inches

*Mean annual air temperature:* 58 to 62 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 48 to 64

*Taxonomic class:* Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic

Udifluvents

### **Associated Soils**

- Pulaski soils which are commonly in the slightly higher areas

### **Typical Pedon**

Tribbey fine sandy loam; Pottawatomie County, Oklahoma; in improved pasture, about 5 miles west and 1 mile south of Bethel, 1,400 feet south and 200 feet east of the northwest corner of sec. 33, T. 10 N., R. 2 E. (Colors are for moist soil unless otherwise stated.)

A—0 to 10 inches; red (2.5YR 4/6) fine sandy loam, red (2.5YR 5/6) dry; weak fine granular structure; slightly hard, very friable; faint stratification; slightly alkaline; clear smooth boundary. (4 to 14 inches thick)

C1—10 to 40 inches; red (2.5YR 4/6) fine sandy loam; massive; slightly hard, very friable; common thin strata of darker and lighter colored loamy fine sand and fine sand; saturated with water at a depth of 30 inches; moderately alkaline; clear smooth boundary. (15 to 60 inches thick)

C2—40 to 50 inches; red (2.5YR 4/6) fine sandy loam; massive; slightly hard, very friable; many thin strata of lighter colored loamy fine sand and fine sand; saturated with water; moderately alkaline; clear smooth boundary. (0 to 50 inches thick)



Ab—50 to 65 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; slightly hard, friable; common fine distinct red (2.5YR 4/6) masses of iron concentration and gray (10YR 5/1) iron depletions; saturated with water; moderately alkaline.

### **Range in Characteristics**

*Depth to buried horizons:* 30 to 55 inches

*Other features:* The soil is saturated with water in one or more layers within 100 cm of the mineral soil surface for 1 month or more per year in 6 years or more out of 10

*A horizon:*

Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 8

Texture—fine sandy loam, loamy fine sand, loam, or clay loam

Reaction—moderately acid to moderately alkaline

Clay content—5 to 35 percent

*C horizon:*

Color—hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8

Texture—fine sandy loam, loam, or loamy very fine sand to a depth of 40 inches; loamy fine sand, fine sandy loam, or loam below a depth of 40 inches

Reaction—moderately acid to moderately alkaline

Clay content—5 to 18 percent

Redoximorphic features (in some pedons below a depth of 30 inches)—gray, brown, or red depletions and concentrations

*Ab horizon (if it occurs):*

Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4

Texture—loam, clay loam, sandy clay loam, or fine sandy loam

Reaction—neutral to moderately alkaline

Clay content—15 to 30 percent

Redoximorphic features—gray, brown, or red depletions and concentrations

*Cb horizon (if it occurs):*

Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4

Texture—loam, clay loam, sandy clay loam, or fine sandy loam

Reaction—neutral to moderately alkaline

Clay content—15 to 30 percent

Redoximorphic features—gray, brown, or red depletions and concentrations

## **Yahola Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material and geologic age:* Recent calcareous loamy alluvium

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Valley

*Landform:* Low flood plain

*Slope range:* 0 to 2 percent

*Slope shape:* Linear-linear

*Elevation range:* 800 to 1,300 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 57 to 64 degrees F



*Frost-free days:* 190 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Coarse-loamy, mixed, superactive, calcareous, thermic Udic  
Ustifluvents

### **Associated Soils**

- Canadian and Dale soils which have mollic surface layers; in the slightly higher areas
- Gaddy soils which are loamy fine sand or coarser material throughout the textural control section; in the slightly lower areas
- Gracemont and Gracemore soils which have a water table within a depth of 40 inches; in the slightly lower areas
- Port soils which have a mollic epipedon and a fine-silty textural control section; in nearby areas
- Miller soils which have a fine textural control section and have a mollic epipedon; in nearby areas
- Pulaski soils which are in nearby areas
- Reinach soils which have a mollic epipedon and a coarse-silty textural control section; in the higher areas

### **Typical Pedon**

Yahola fine sandy loam; Jefferson County, Oklahoma; about 7 miles west and 1 mile north of Ryan, about 2,000 feet north and 200 feet east of the southwest corner of sec. 18, T. 6 S., R. 8 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 11 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable; calcareous; moderately alkaline; gradual smooth boundary.

C1—11 to 40 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable; thin strata of loamy fine sand and silt loam in the lower part of horizon; calcareous; moderately alkaline; gradual smooth boundary.

C2—40 to 56 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable; calcareous; moderately alkaline; gradual smooth boundary.

C3—56 to 72 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; thin strata of loamy fine sand to clay loam; calcareous; moderately alkaline.

### **Range in Characteristics**

#### *A horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 to 7 (dry) and 3 to 6 (moist), and chroma of 2 to 6; where value is 5.5 or less (3 moist), chroma is 3.5 or less, and horizon thickness is more than 10 inches, the organic matter content is less than 1 percent

Texture—loamy fine sand, fine sandy loam, very fine sandy loam, or loam; where the horizon is loamy fine sand, it is less than 12 inches thick

Reaction—slightly alkaline or moderately alkaline; horizon is typically calcareous

#### *C horizon:*

Color—hue of 2.5YR to 7.5YR, value of 5 to 7 (dry) and 4 to 6 (moist), and chroma of 3 to 8

Texture—fine sandy loam, very fine sandy loam, or loam above a depth of 40 inches; fine sandy loam, loam, silt loam, or loamy fine sand below a depth of 40 inches; thin strata of coarser or finer materials occur throughout the horizon

Clay content—5 to 18 percent above a depth of 40 inches

Reaction—moderately alkaline; horizon is calcareous

## **Zaneis Series**

*Major land resource area:* Central Rolling Red Prairies (80A)

*Depth class:* Deep

*Drainage class:* Well drained

*Parent material and geologic age:* Material weathered from interbedded sandstone and shale of Permian age

*Physiographic region:* Interior Lowlands

*Physiographic province:* Central Lowland

*Physiographic sub-province:* Osage Plain

*Landscape:* Upland

*Landform:* Hills

*Landform position:* Summit and backslope

*Slope range:* 0 to 8 percent

*Slope shape:* Linear-convex or convex-convex

*Elevation range:* 900 to 1,200 feet

*Mean annual precipitation:* 26 to 40 inches

*Mean annual air temperature:* 58 to 64 degrees F

*Frost-free days:* 200 to 230

*Thorntwaite PE index:* 44 to 64

*Taxonomic class:* Fine-loamy, siliceous, active, thermic Udic Argiustolls

### **Associated Soils**

- Bethany soils which have a fine control section; on the slightly higher broad flats
- Chickasha and Coyle soils which are in areas similar to those of the Zaneis soils
- Grainola soils which do not have a mollic epipedon, have a fine control section, and have a solum less than 40 inches thick; on side slopes
- Loco and Lucien soils which have a solum less than 20 inches thick and do not have Bt horizons; commonly on ridge crests and upper side slopes
- Mulhall soils which are on the slightly lower side slopes and footslopes
- Nash soils which have a coarse-silty control section and do not have Bt horizons; commonly in areas similar to those of the Zaneis soils
- Renfrow soils which have a fine control section; on the slightly higher convex ridge crests
- Stephenville soils which do not have a mollic epipedon and have a solum less than 40 inches thick; in areas that are similar to those of the Zaneis soils but that have savannah vegetation
- Teller soils which are typically in the slightly lower areas that are closer to the stream channel

### **Typical Pedon**

Zaneis loam (fig. 25); Oklahoma County, Oklahoma; in a cultivated area, about 1 mile east and 5 miles north of Edmond, 100 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 14 N., R. 2 W. (Colors are for dry soil unless otherwise stated.)

A1—0 to 6 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to weak fine granular; slightly hard, very friable; many very fine and few fine roots; many very fine and fine continuous tubular pores; moderately acid; abrupt smooth boundary. (0 to 10 inches thick)

A2—6 to 12 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very

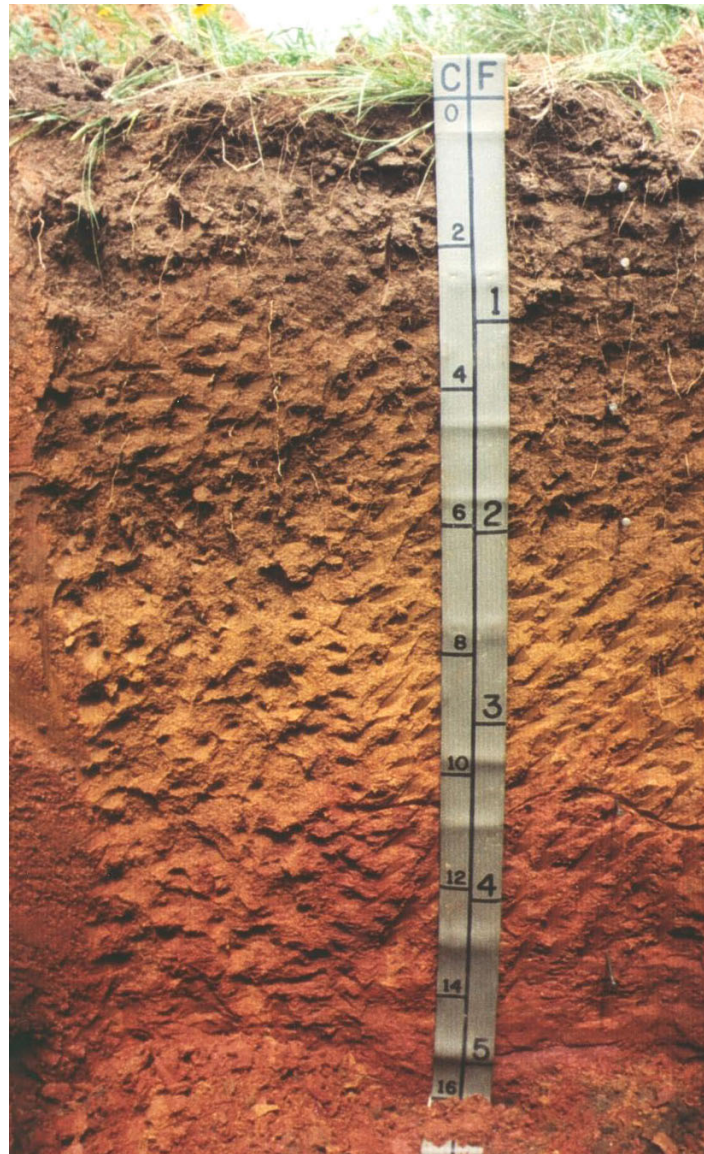


Figure 25.—Profile of Zaneis loam. Multiply the scale on the left by 10 for centimeters.

- friable; many very fine and few fine roots; many very fine and fine continuous tubular pores; moderately acid; clear smooth boundary. (4 to 14 inches thick)
- BA—12 to 19 inches; brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3) moist; weak fine prismatic structure parting to weak fine subangular blocky; hard, firm; many very fine and few fine and medium roots; common very fine and fine continuous tubular pores; moderately acid; gradual smooth boundary. (0 to 7 inches thick)
- Bt1—19 to 31 inches; brown (7.5YR 5/3) clay loam, brown (7.5YR 4/3) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, very firm; many very fine and few fine roots; common very fine and fine continuous tubular pores; common distinct continuous clay films on vertical and horizontal faces of peds; slightly acid; gradual wavy boundary. (4 to 18 inches thick)
- Bt2—31 to 39 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR

4/4) moist; moderate coarse prismatic structure parting to moderate medium blocky; very hard, very firm; common very fine roots; common very fine and fine continuous tubular pores; common distinct continuous clay films on vertical and horizontal faces of peds; common medium distinct red (2.5YR 4/6) redoximorphic concentrations; few fine iron-manganese concretions; moderately acid; gradual wavy boundary. (6 to 23 inches thick)

Bt3—39 to 48 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm; common very fine roots; many very fine and common fine continuous tubular pores; common distinct discontinuous clay films on vertical and horizontal faces of peds; common coarse prominent olive yellow (5Y 6/6), reddish brown (2.5YR 5/4), and brown (7.5YR 5/3) redoximorphic concentrations; common fine iron-manganese concretions; brown (7.5YR 4/3) material in root channels; slightly acid; gradual wavy boundary. (0 to 24 inches thick)

Bt4—48 to 55 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, firm; few very fine roots; few very fine, many fine, and common medium continuous tubular pores; common faint discontinuous clay films on vertical faces of peds; common medium distinct dark red (2.5YR 3/6) redoximorphic concentrations; few fine iron-manganese concretions; brown (7.5YR 4/3) material along root channels; slightly acid; clear wavy boundary. (0 to 15 inches thick)

BC—55 to 59 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak coarse subangular blocky structure; hard, friable; few very fine roots; common very fine and many fine continuous tubular pores; few medium distinct dark red (10R 3/6) redoximorphic concentrations; brown (7.5YR 4/3) material along root channels; 10 percent, by volume, weathered sandstone fragments; slightly acid; abrupt wavy boundary. (0 to 10 inches thick)

Cr—59 to 65 inches; red (2.5YR 4/6) soft laminated sandstone, dark red (2.5YR 3/6) moist; slightly acid.

### Range in Characteristics

*Thickness of the mollic epipedon:* Less than 20 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to bedrock:* 40 to 60 inches

#### *A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—loam or fine sandy loam

Reaction—moderately acid to neutral

Clay content—10 to 26 percent

#### *BA horizon:*

Color—hue of 5YR or 7.5YR, value of 4, and chroma of 2 to 4

Texture—loam or clay loam

Reaction—moderately acid to neutral

Clay content—18 to 30 percent

#### *Bt1 horizon:*

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4

Texture—loam, clay loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

Clay content—18 to 30 percent

#### *Bt2 horizon:*

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6

Texture—clay loam or sandy clay loam

Reaction—moderately acid to slightly alkaline

Clay content—20 to 38 percent

*Bt3 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Texture—clay loam or sandy clay loam

Reaction—slightly acid to moderately alkaline

Clay content—20 to 38 percent

Redoximorphic features—red or brown concentrations

*Bt4 horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—fine sandy loam, clay loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

Clay content—18 to 30 percent

Redoximorphic features—red or brown concentrations

*BC horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—fine sandy loam, clay loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

*Cr horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—weathered sandstone



# Formation of the Soils

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This section discusses the factors of soil formation and how they relate to the soils in Logan County. It also discusses the geology of the survey area.

## Factors of Soil Formation

The following paragraphs describe the five factors of soil formation—climate, living organisms, topography, parent material, and time. The combined influence of these factors determines the characteristics and properties of a soil.

### Climate

Logan County has a moist, subhumid climate. Because the climate is fairly uniform throughout the county, differences among soils cannot be attributed to differences in climate based on the present climatic regime. Moisture and warm temperatures have been sufficient for the formation of distinct layers in many of the soils. Soil leaching is moderate. The physical abrasion and redistribution of materials by wind action contributes to soil formation. Cold temperatures occur often enough and long enough in the survey area to alter materials through the processes of freezing and thawing.

### Living Organisms

Plants, burrowing animals, insects, and soil micro-organisms have a direct influence on the formation of soils. The native grasses and trees in the county have had different effects on the losses and gains of organic matter and plant nutrients in the soil and on soil structure and porosity. Soils that formed under prairie vegetation, such as Kirkland and Norge, have a dark grayish brown surface layer and a moderately high content of organic matter. Soils that formed under trees, such as Littleaxe and Stephenville, have a brown surface layer and a low content of organic matter.

### Topography

Relief influences the formation of the soils mainly through its effect on water movement, erosion, soil temperature, and the kind of plant cover. In Logan County, relief is determined largely by the resistance of underlying formations to weathering and geological erosion. The topography of the eastern third of Logan County consists of rolling to hilly uplands with long, narrow, very gently sloping to moderately sloping summits. The drainage deeply dissects the uplands, thus forming broad, gently sloping to steep side slopes with narrow flood plains. The native vegetation is a savannah of post oak and blackjack oak with an understory of tall and mid grasses. The western two thirds of Logan County consists of nearly level to rolling uplands with broad, nearly level and very gently sloping summits. The drainage dissects the uplands, thus forming the long, broad, gently sloping to moderately steep side slopes with wide flood plains. Steep rock escarpments occasionally break the side slopes from the flood plains on many of the major streams. The native vegetation is mid and tall prairie grasses.

## Parent Material

Soils form in unconsolidated material, which influences the rate of formation; the chemical, physical, and mineral composition of the soil; and the color of the soil. Soils on the uplands in Logan County formed in material weathered from sandstone, clay beds, and shale. Soils that formed in shale and clay beds include Masham, Piedmont, Renthin, and Renfrow. Soils that formed in sandstone are Darsil, Ironmound, Stephenville, Coyle, and Zaneis.

Alluvial sediment is extensive along streams and rivers in the county. The kind of sediment deposited and the kinds of soil that formed in it largely depend on the source of the sediment and the velocity of the streams. Soils that formed in ancient fluvial sediments are Navina and Kirkland. Soils that formed in recent fluvial sediments are Gaddy, Lawrie, and Yahola.

## Time

As a factor in soil formation, time is difficult to measure in years. The length of time needed for the development of genetic horizons depends on the intensity and the interactions of the other soil-forming factors in promoting the loss, gain, transfer, or transformation of the constituents that make up soil horizons. Soils that have no definite genetic horizons are young or immature. Mature or older soils are in equilibrium with their environment and tend to have well defined horizons.

The soils in Logan County range from young to old. Bethany and Renfrow soils are examples of old soils. Coyle and Teller soils are younger, but they have well expressed horizons. Darsil and Masham soils are considered young soils. Although these soils have had sufficient time to develop well expressed horizons, geological erosion has taken away soil material almost as fast as it forms because the soils are in sloping areas. Gaddy and Yahola soils are young soils that formed in recent sediments on flood plains. These soils show little horizon development.

## Geology

Kenneth S. Johnson, Oklahoma Geological Survey, the University of Oklahoma, Norman, Oklahoma, helped prepare this section.

The surface geology of Logan County is fairly simple. It is shown on the surface geology map of the county included with the soil maps. The outcropping rocks in this county consist of reddish brown sandstones and shales of Permian age. These sediments were deposited near the shores of shallow seas that once covered much of western Oklahoma. In many parts of the county, these sedimentary rocks are mantled by unconsolidated alluvium of Quaternary age that was laid down by ancient or modern rivers and streams. Permian sandstones provide major fresh-water aquifers in the southern part of the county. Unconsolidated alluvium near the Cimarron River and its tributaries also yields fresh ground water. The outcropping Permian strata overlie older sedimentary rocks that are important petroleum reservoirs in many parts of Oklahoma.

Subsurface rock units of sedimentary origin are about 8,000 feet thick in the northeastern part of Logan County and about 10,000 feet thick in the southwestern part. These strata rest upon a "basement" of granite and other igneous or metamorphic rocks that extend 20 to 25 miles down into the earth's crust. These subsurface sedimentary rocks were deposited in great, shallow seas that bordered the deep sedimentary basins of western Oklahoma, including the Anadarko Basin to the southwest and the Arkoma Basin to the southeast. These seas inundated the survey area intermittently from the Cambrian Period of geologic time (about 525 million years ago) through Late Permian time (about 250 million years ago). Logan County is

considered part of the Central Oklahoma Arch, an area that was gently uplifted in several episodes prior to Permian time. The Nemaha Uplift, a series of buried, fault-bounded uplift blocks, formed during Pennsylvanian time. It extends in a north-south direction in the subsurface material in the western part of the county.

The outcropping rocks in Logan County were deposited during the Late Permian Period (about 250 to 270 million years ago). Sands, silts, and clays were eroded from marginal land areas that existed during this time in eastern Oklahoma and adjacent parts of Arkansas. These materials were transported generally to the west and northwest by streams and rivers that flowed, at the time, toward the large inland sea (Anadarko Basin) that covered most of western Oklahoma. Logan County was close to the shoreline of this ancient sea, and, therefore, was the site for deposition of interbedded sandstones, siltstones, and shales in alternating riverine, deltaic, tidal-flat, and shallow marine environments.

Permian rock outcrops are typically red or reddish brown with local light gray or greenish gray variations. The red color in these sedimentary rocks primarily results from the presence of iron oxide minerals (e.g., hematite), which are commonly distributed uniformly throughout the rocks. Iron oxides generally do not occur in sedimentary rocks having grayish, greenish, or whitish colors. Soils that developed from Permian reddish rocks tend to retain the hematite stain of the parent material. This tendency explains the red color of most of the soils in Logan County.

The oldest rocks exposed in the survey area crop out along the eastern county boundary and are overlain by successively younger Permian strata to the west. These outcropping strata dip gently to the west at an angle of less than 1 degree, as shown in the east-west cross section included with the surface geology map.

The parent materials of soils are generally the product of weathering and disaggregation of outcropping rock units. As such, there is a close relationship between the physical and chemical properties of these rock formations and the soils that develop upon them. Therefore, a description of the rock units that crop out in the county can help to explain the character and distribution of soils.

The oldest rock unit exposed in Logan County is the Wellington Formation. The Wellington sediments in Logan County consist mainly of red-brown shales with interbeds of red-brown and orange-brown sandstones and siltstones. Sandstone beds in the Wellington Formation and the overlying Garber Sandstone comprise the well-known Garber-Wellington aquifer, which is discussed below. The Wellington sediments are exposed only in the eastern part of the county, where the Cimarron River and tributaries of the Cimarron and Deep Fork Rivers cut deeply through overlying strata. The Wellington Formation is generally 400 to 500 feet thick in this area, although only the uppermost 200 feet of the Wellington sediments are exposed in Logan County. Landscapes in areas of the Wellington Formation are characterized by gently rolling hills that are forested with scrub oak, blackjack oak, and other small, slow-growing deciduous trees. Sandy soils and moderate amounts of rainfall (the average annual precipitation is about 32 inches) favor this type of vegetation.

The Wellington Formation outcrops south of the Cimarron River are the parent material for soils in the Stephenville-Darsil-Harrah and Grainola-Masham-Ironmound general soil map units. The Wellington outcrops north of the Cimarron River are the parent material for soils in the Coyle-Ironmound-Zaneis, Grainola-Renfrow-Piedmont, and Grainola-Masham-Ironmound general soil map units. These loamy and clayey soils formed in alluvium, colluvium, and residuum weathered from sandstone, shale, and interbedded sandstone and shale. The soils are shallow to very deep, are well drained to excessively drained, and occur on nearly level to steep slopes. Soils that developed in Wellington sandstones typically are moderately permeable, and those that developed in Wellington shales are very slowly permeable.

The Garber Sandstone conformably overlies the Wellington Formation. This formation crops out over a large portion of Logan County. The Garber Sandstone



deposits primarily consist of orange-brown to red-brown sandstone beds that are irregularly interlayered with red-brown shales and siltstones, with the amount of shale increasing northward. In Logan County, the total thickness of the Garber Sandstone ranges from about 400 to 500 feet. The Garber Sandstone outcrop area is characterized by gently rolling hills that are covered with prairie grasses. Steeper side slopes associated with drainageways are covered with blackjack oak, post oak, cedar, and elm.

Nearly half of the Garber Sandstone outcrop area in Logan County is the parent material for soils in the Coyle-Ironmound-Zaneis general soil map unit. The remainder of this outcrop provides parent material for soils in the Stephenville-Darsil-Harrah and Grainola-Renfrow-Piedmont general soil map units. These loamy and clayey soils formed primarily in alluvium, colluvium, and residuum weathered from sandstone or interbedded sandstone and shale. The soils are shallow to very deep, well drained to excessively drained, and very gently sloping to steep. Because the soils developed mainly from the Garber Sandstone, they typically are moderately permeable. The Kirkland-Renfrow general soil map unit coincides with the Garber Sandstone outcrops in the northwestern and southwestern parts of Logan County. Kirkland and Renfrow soils formed in shale or clayey alluvium overlying shale or siltstone and are very slowly permeable. In this area, Kirkland and Renfrow soils probably developed in a thin layer of overlying Hennessey Group shales that were not completely eroded from above the Garber Sandstone. This same situation may also apply to areas of the Grainola-Renfrow-Piedmont general soil map unit.

The Hennessey Group conformably overlies the Garber Sandstone and has an outcrop area that is characterized by nearly level and gently sloping grass-covered prairies. This prairie landscape is largely barren of trees, except along intermittent streams where precipitation runoff concentrates. The Hennessey Formation, which crops out in only about 5 percent of Logan County, consists mainly of reddish brown shale with some interbeds of siltstone and fine-grained sandstone. The total thickness of Hennessey sediments west of Logan County is about 400 feet. The upper part of the Hennessey Formation, however, has been removed by erosion and only the lower 50 to 150 feet remain in the western part of the county. The Hennessey Group is the parent material for soils in the Grainola-Renfrow-Piedmont, Kirkland-Renfrow, and Grainola-Masham-Ironmound general soil map units. These clayey soils formed mainly in alluvium and residuum weathered from a shale section that may have minor sandstone interbeds. The soils are moderately deep to very deep, are well drained, and occur on nearly level to sloping landscapes (only locally are they steep). Soils that developed from the Hennessey Group shales typically are very slowly permeable.

Alluvium and terrace deposits of Quaternary age in Logan County are generally 10 to 75 feet thick and consist mainly of sand, silt, and clay interbeds with few gravel lenses. These sediments were eroded from Permian strata within and to the west of Logan County and also from other rock units that occur west and northwest of the county and within the Cimarron River drainage basin. Quaternary sediments (deposited approximately within the past million years) were laid down mainly as flood plain or alluvial deposits along major rivers and streams flowing across the county, predominantly to the southeast, east, and northeast. In addition, some of the sands and silts have been windblown into dunes.

Terrace deposits, which consist of older alluvium left behind after a river shifted position or cut more deeply into underlying material, occur either as broad and level or hummocky and undulating expanses that are topographically higher than, and generally adjacent to, present-day flood plains. They occur mainly north of the Cimarron River flood plain but also may occur in smaller areas near the other streams.

Terrace deposits are the parent material for soils in the Dougherty-Konawa-Derby general soil map unit in the western part of the county and the Teller-Navina-Konawa general soil map unit in the central part. Soils in both of these map units are typically

very deep, are well drained and somewhat excessively drained, and occur on nearly level to moderately steep and rolling landscapes. These loamy and sandy soils formed in Quaternary alluvial and windblown sediments. Because of the unconsolidated, sandy nature of the parent material, these soils commonly are moderately permeable or permeable.

Alluvial deposits are the unconsolidated sediments in stream channels or on flood plains of modern-day rivers and streams, such as the main stem and tributaries of the Cimarron River and tributaries of the Deep Fork River in the southeastern part of Logan County. Cimarron River alluvium is the parent material for soils in the Yahola-Gaddy general soil map unit. Alluvium associated with tributaries of the Cimarron and Deep Fork Rivers is parent material for soils in the Ashport-Pulaski-Lawrie general soil map unit. Soils that developed in Quaternary alluvium in this area are typically very deep, well drained and somewhat excessively drained, and nearly level and gently undulating. The Yahola-Gaddy and Ashport-Pulaski-Lawrie general soil map units are characterized by loamy surface and subsoil textures, although soils along the Cimarron River also have significant amounts of sandy loams and sands. Because of the unconsolidated, sandy nature of these soils, they typically are moderately permeable to rapidly permeable.



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# Glossary

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**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Alluvium.** Material, such as gravel, sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Area reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.

**Aspect.** The direction in which a slope faces.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3
Low .....	3 to 6
Moderate .....	6 to 9
High .....	9 to 12
Very high .....	more than 12

**Backslope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

- Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.
- Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.
- Blowout.** A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.
- Bottom land.** The normal flood plain of a stream, subject to flooding.
- Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.
- Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.
- Brush management.** Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.
- Butte.** An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.
- Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
- Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.
- Canyon.** A long, deep, narrow, very steep-sided valley with high, precipitous walls in an area of high local relief.
- Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
- Catena.** A sequence of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
- Cemented.** Material in an air-dry test specimen that does not slake after being immersed in water for 1 hour. Cemented soil material has a brittle, hard consistence caused by some cementing agent other than clay. Calcium carbonate, silica, or oxides or salts of iron and aluminum are common cementing materials.
- Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.
- Channery soil material.** Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

- Chemical treatment.** Control of unwanted vegetation through the use of chemicals.
- Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.
- Clayey soil.** Silty clay, sandy clay, or clay.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
- Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.
- Coarse fragments.** Mineral or rock particles larger than 2 millimeters in diameter.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
- Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
- Compressible** (in tables). Excessive decrease in volume of soft soil under load.
- Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.
- Conglomerate.** A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.
- Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.



- Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.
- Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."
- Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.
- Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.
- Consolidated siltstone.** Siltstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.
- Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.
- Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
- Coppice dune.** A small dune of fine-grained soil material stabilized around shrubs or small trees.
- Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.
- Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.
- Cropping system.** Growing crops according to a planned system of rotation and management practices.
- Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.
- Cuesta.** A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.
- Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.
- Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.
- Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.
- Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.
- Dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.
- Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.
- Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

- Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.
- Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.
- Drainage class (natural).** Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”
- Drainage, surface.** Runoff, or surface flow of water, from an area.
- Drainageway.** An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.
- Draw.** A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.
- Dune.** A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.
- Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.
- Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
- Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.
- Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.
- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.  
*Erosion (geologic).* Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.  
*Erosion (accelerated).* Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.
- Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

**Excess lime** (in tables). Excess carbonates in the soil that restrict the growth of some plants.

**Excess salts** (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

**Excess sodium** (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fast intake** (in tables). The rapid movement of water into the soil.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material.** Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Footslope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**Fragile** (in tables). A soil that is easily damaged by use or disturbance.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gilgai.** Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter. Very gravelly soil material has 35 to 60 percent of these rock fragments, and extremely gravelly soil material has more than 60 percent.

**Green manure crop (agronomy).** A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Gypsum.** A mineral consisting of hydrous calcium sulfate.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Heavy metal.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential.

The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state.

Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 .....	very low
0.2 to 0.4 .....	low
0.4 to 0.75 .....	moderately low
0.75 to 1.25 .....	moderate
1.25 to 1.75 .....	moderately high
1.75 to 2.5 .....	high
More than 2.5 .....	very high

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.



*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $\frac{1}{3}$ - or  $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Mesa.** A broad, nearly flat-topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical

composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Microhigh.** An area that is 2 to 12 inches higher than the adjacent microlow.

**Microlow.** An area that is 2 to 12 inches lower than the adjacent microhigh.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size.

Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Natric horizon.** A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Pebble.** See Gravel.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedisediment.** A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher-lying areas of the erosion surface.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The downward movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil adversely affects the specified use.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow .....	0.00 to 0.01 inch
Very slow .....	0.01 to 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 inch to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plateau.** An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

**Playa.** The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas. Temporary flooding occurs primarily in response to precipitation and runoff.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter** (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.



**Poorly graded.** Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Poor outlets** (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

**Potential native plant community.** See Climax plant community.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannahs, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Ridge.** A long, narrow elevation of the land surface. It generally is sharp crested and forms an extended upland between valleys.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

**Riser.** The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rubble land.** Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline .....	0 to 2
Very slightly saline .....	2 to 4
Slightly saline .....	4 to 8
Moderately saline .....	8 to 16
Strongly saline .....	more than 16

**Sand.** As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material.

Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water.

Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.

**Sediment.** Solid, clastic material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, wind, ice, or mass wasting, and has come to rest on the earth's surface either above or below sea level.

**Sedimentary plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water.

The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Sedimentary uplands.** Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shoulder slope.** The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Similarity index.** The present composition of the plant community on an ecological site in relation to the potential natural plant community for that site. Similarity index is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slick spot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

**Slippage** (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level .....	0 to 1 percent
Very gently sloping .....	1 to 3 percent
Gently sloping .....	3 to 5 percent
Moderately sloping .....	5 to 8 percent
Strongly sloping .....	8 to 12 percent
Moderately steep .....	12 to 20 percent
Steep .....	20 to 45 percent
Very steep .....	45 percent and higher

Classes for complex slopes are as follows:

Nearly level .....	0 to 3 percent
Gently undulating .....	1 to 5 percent
Undulating .....	1 to 8 percent
Gently rolling .....	5 to 12 percent
Rolling .....	5 to 15 percent
Hilly .....	8 to 30 percent
Steep .....	20 to 45 percent
Very steep .....	45 percent and higher

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slow intake** (in tables). The slow movement of water into the soil.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones** (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . The degrees of sodicity and their respective ratios are:

Slight .....	less than 13:1
Moderate .....	13 to 30:1
Strong .....	more than 30:1

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate

and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stratified.** Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

**Strath terrace.** A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Tailwater.** The water directly downstream of a structure.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace (geologic).** An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

**Thin layer** (in tables). Otherwise suitable soil material too thin for the specified use.

**Thornthwaite PE index.** The annual PE index is the sum of the 12 monthly precipitation effectiveness indices.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The outermost inclined surface at the base of a hill; part of a footslope.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Toxicity** (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Tread.** The relatively flat terrace surface that was cut or built by stream or wave action.

**Unstable fill** (in tables). Risk of caving or sloughing on banks of fill material.

**Upland (geology).** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley.** An elongated depressional area primarily developed by stream action.

**Valley fill.** Alluvium deposited by heavily loaded streams.



**Variiegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

# NRCS Accessibility Statement

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UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

### GENERAL SOIL MAP

#### LOGAN COUNTY, OKLAHOMA

1

0

1

2

3

MILES

1

0

1

2

3

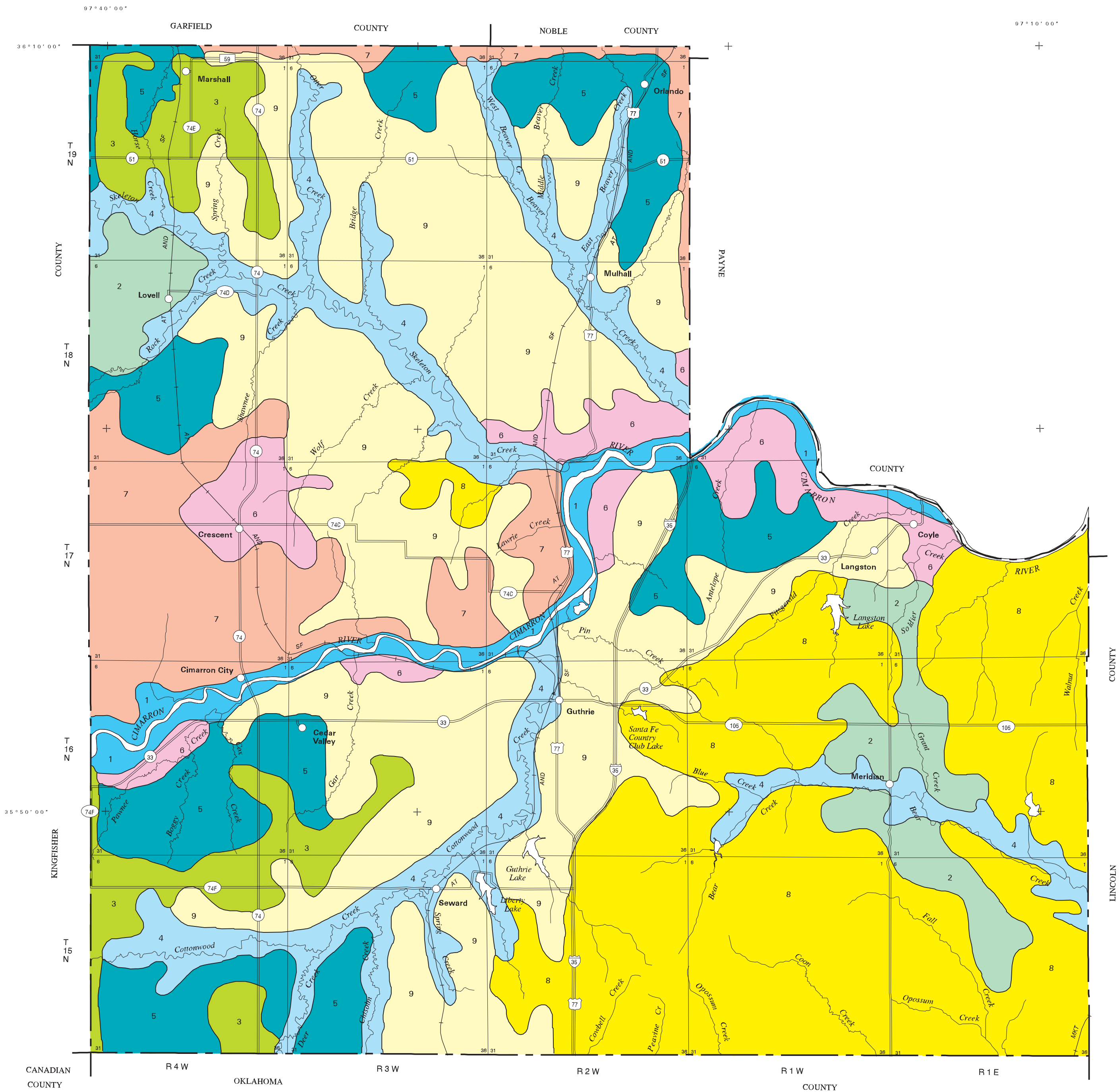
4

5

6

KILOMETERS

SCALE = 1:145000



LEGEND

- 1

OK079 GRACEMORE-GADDY-GOODNIGHT  
Yahola-Gaddy
- 2

OK086 GRAINOLA-LUCIEN-RENFROW  
Grainola-Masham-Ironmound
- 3

OK094 KIRKLAND-RENFROW-ZANEIS  
Kirkland-Renfrow
- 4

OK112 PORT-PULASKI-ASHPORT  
Ashport-Pulaski-Lawrie
- 5

OK116 RENFROW-KIRKLAND-GRAINOLA  
Grainola-Renfrow-Piedmont
- 6

OK121 TELLER-KONAWA-NORGE  
Teller-Navina-Konawa
- 7

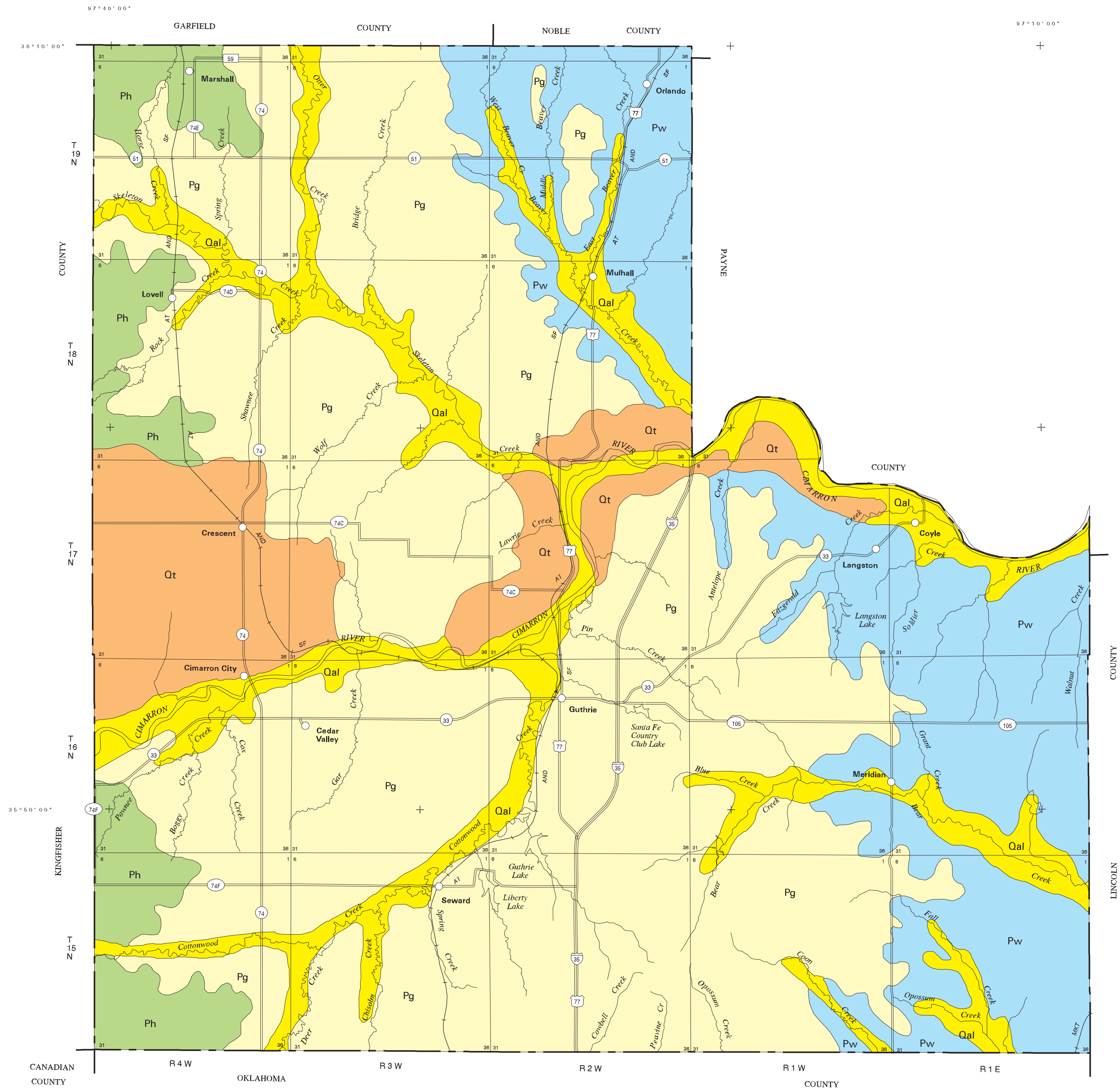
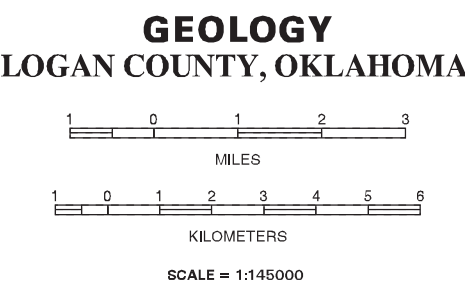
OK141 DOUGHERTY-EUFAULA  
Dougherty-Konawa-Derby
- 8

OK151 STEPHENVILLE-DARNELL-NEWALLA  
Stephenville-Darsil-Harrah
- 9

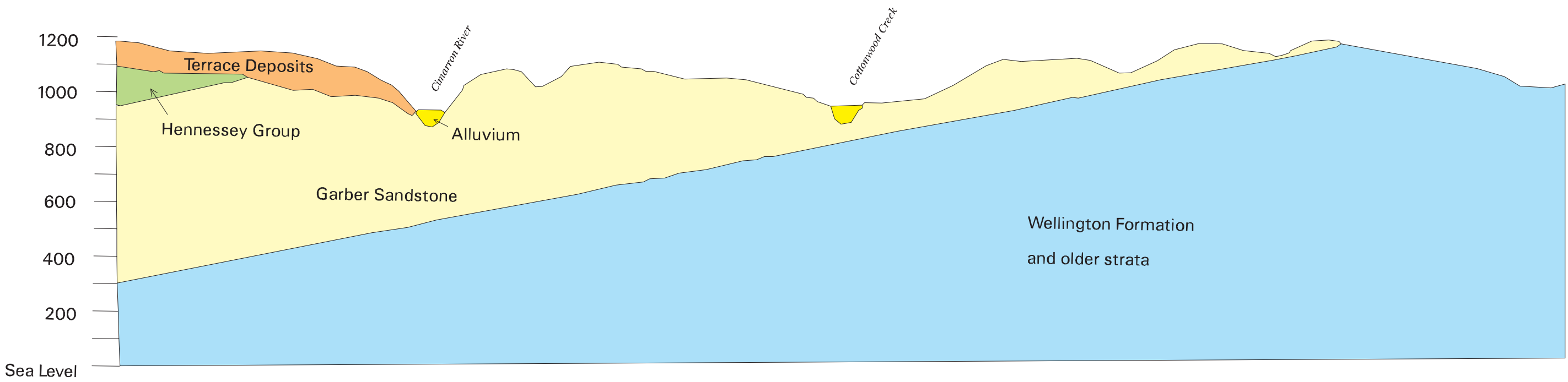
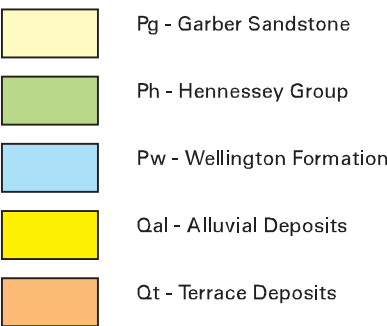
OK225 COYLE-IRONMOUND-ZANEIS  
Coyle-Ironmound-Zaneis

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SECTIONALIZED TOWNSHIP				
6	5	4	3	2
7	8	9	10	11
18	17	16	15	14
19	20	21	22	23
30	29	28	27	26
31	32	33	34	35



LEGEND



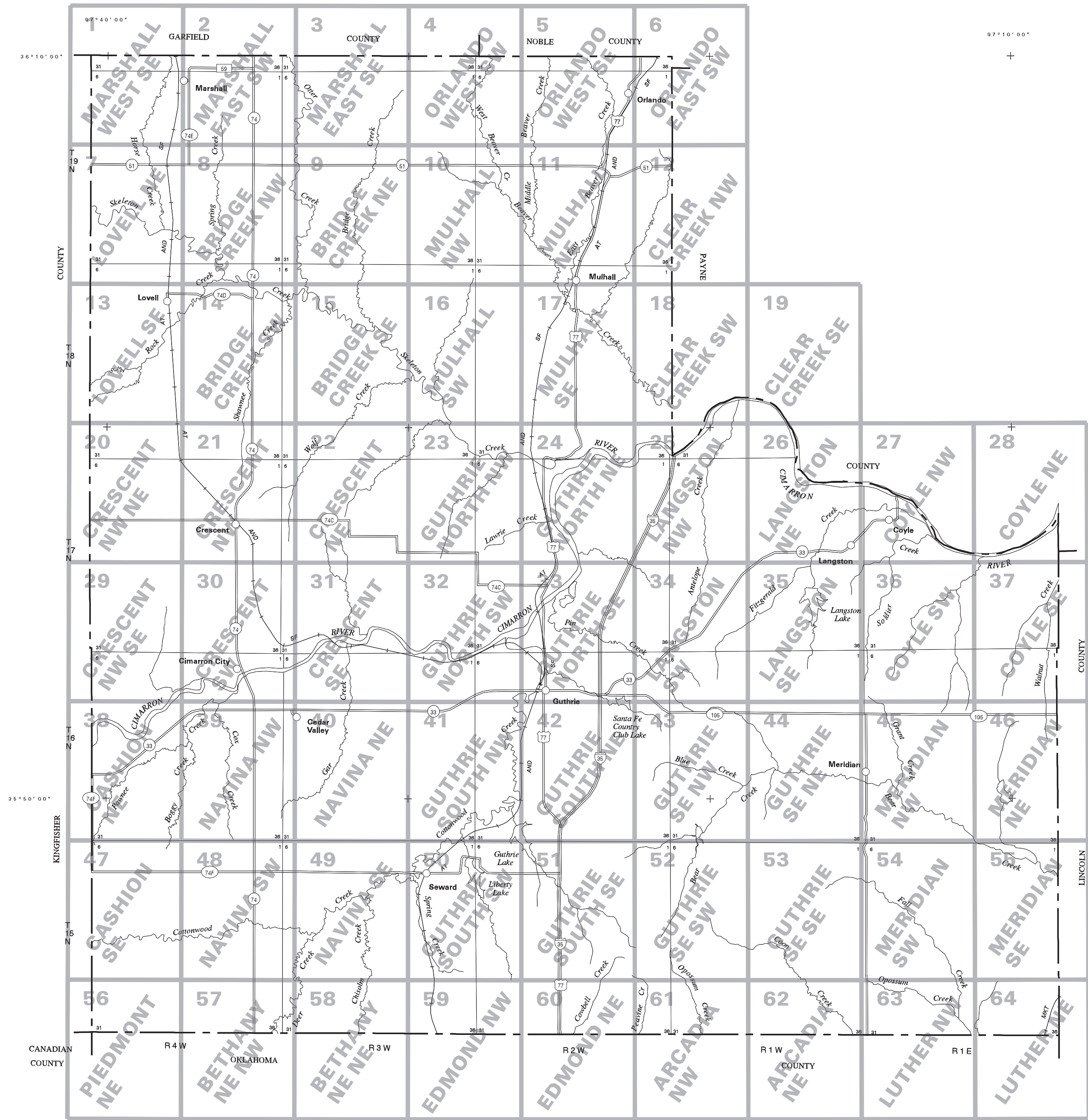
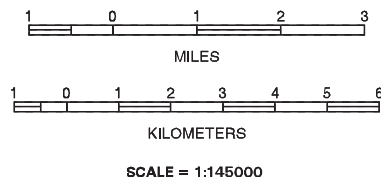
SECTIONALIZED  
TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36





INDEX TO MAP SHEETS  
LOGAN COUNTY, OKLAHOMA



SECTIONALIZED TOWNSHIP				
6	5	4	3	2
7	8	9	10	11
18	17	16	15	14
19	20	21	22	23
30	29	28	27	26
31	32	33	34	35



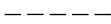
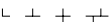






SOIL LEGEND

Map unit symbols and names are listed in alphabetical order. Map symbols are alpha-numeric. The first letter is always capital and is the initial letter of the soil series name. The second and third letters are lowercase, unless the map unit is an undifferentiated group, complex, or miscellaneous area, and typically are related to the soil name. The fourth letter is capital and represents the slope class. The fifth part of the symbol, a number, represents the erosion class.


SYMBOL	NAME	SYMBOL	NAME
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded	LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes
AstA	Ashport silt loam, 0 to 1 percent slopes, frequently flooded	LitC2	Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded
BetA	Bethany silt loam, 0 to 1 percent slopes	M-W	Miscellaneous water
BetB	Bethany silt loam, 1 to 3 percent slopes	MaID	Masham-Ironmound complex, 5 to 15 percent slopes
BocA	Bocox loamy fine sand, 0 to 1 percent slopes	MaIG	Masham-Ironmound complex, 15 to 40 percent slopes
BtlA	Bathel loamy sand, 0 to 1 percent slopes	MinB	Minco very fine sandy loam, 1 to 3 percent slopes
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded	MinC	Minco very fine sandy loam, 3 to 5 percent slopes
CAID	Coyle-Ashport-Ironmound complex, 1 to 8 percent slopes	MinD	Minco very fine sandy loam, 5 to 8 percent slopes
ColC2	Coyle-Ironmound complex, 3 to 5 percent slopes, eroded	MinF	Minco very fine sandy loam, 8 to 20 percent slopes
CoUB	Coyle-Urban land complex, 1 to 3 percent slopes	MIIA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded
CoUC	Coyle-Urban land complex, 1 to 5 percent slopes	MuIC	Mulhall loam, 3 to 5 percent slopes
CoyB	Coyle loam, 1 to 3 percent slopes	MuIC2	Mulhall loam, 3 to 5 percent slopes, eroded
CoyC2	Coyle loam, 3 to 5 percent slopes, eroded	NavA	Navina fine sandy loam, 0 to 1 percent slopes
CoZC3	Coyle and Zaneis soils, 3 to 5 percent slopes, severely eroded	NavB	Navina fine sandy loam, 1 to 3 percent slopes
DAM	Dam	NeGD4	Newalla-Gullied land complex, 3 to 8 percent slopes
DerB	Derby loamy fine sand, 0 to 3 percent slopes	NewB	Newalla fine sandy loam, 1 to 3 percent slopes
DerD	Derby loamy fine sand, 3 to 8 percent slopes	NorA	Norge silt loam, 0 to 1 percent slopes
DerE	Derby loamy fine sand, 8 to 15 percent slopes	NorB	Norge silt loam, 1 to 3 percent slopes
DIRG	Darsil-Rock outcrop complex, 15 to 45 percent slopes	NorC2	Norge silt loam, 3 to 5 percent slopes, eroded
DouB	Dougherty loamy fine sand, 0 to 3 percent slopes	OWHD	Oil waste land-Huska complex, 1 to 8 percent slopes
DouD	Dougherty loamy fine sand, 3 to 8 percent slopes	PieB	Piedmont silty clay loam, 1 to 3 percent slopes
DUM	Dumps	PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded
EasA	Easpur loam, 0 to 1 percent slopes, occasionally flooded	PIT	Pits
GadA	Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded	PuKA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded
GaGA	Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded	PuIA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded
GMGE4	Grainola-Masham-Gullied land complex, 5 to 15 percent slopes	RenB	Renfrow silt loam, 1 to 3 percent slopes
GMLG	Grainola-Masham-Lucien complex, 5 to 40 percent slopes, very bouldery	RenC	Renfrow silt loam, 3 to 5 percent slopes
GohC	Goodnight loamy fine sand, 1 to 5 percent slopes	RewC2	Renfrow silty clay loam, 3 to 5 percent slopes, eroded
GohE	Goodnight loamy fine sand, 5 to 15 percent slopes	RinB	Renthin silt loam, 1 to 3 percent slopes
GooE	Goodnight fine sand, 1 to 15 percent slopes	RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded
GooG	Goodnight fine sand, 15 to 45 percent slopes	SDGD4	Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes
GraC	Grainola silty clay loam, 3 to 5 percent slopes	SDND	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes
GraD2	Grainola silty clay loam, 5 to 8 percent slopes, eroded	SDND2	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded
GrHC	Grant-Huska complex, 1 to 5 percent slopes	SlaB	Slaughterville fine sandy loam, 1 to 3 percent slopes
GrIE	Grainola-Ironmound complex, 3 to 12 percent slopes	SlaD	Slaughterville fine sandy loam, 3 to 8 percent slopes
GrLE	Grainola-Lucien complex, 5 to 12 percent slopes	SlaF	Slaughterville fine sandy loam, 8 to 20 percent slopes
HaGD4	Harrah-Gullied land complex, 5 to 8 percent slopes	SiDC	Stephenville-Darsil complex, 1 to 5 percent slopes
HarC	Harrah fine sandy loam, 3 to 5 percent slopes	SiDC2	Stephenville-Darsil complex, 1 to 5 percent slopes, eroded
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded	SiDE	Stephenville-Darsil complex, 5 to 15 percent slopes
HarG	Harrah fine sandy loam, 3 to 45 percent slopes	SteB	Stephenville fine sandy loam, 1 to 3 percent slopes
HawB	Hawley loamy fine sand, 0 to 3 percent slopes, rarely flooded	SteC2	Stephenville fine sandy loam, 3 to 5 percent slopes, eroded
ICGD3	Ironmound-Coyle-Grainola complex, 5 to 8 percent slopes, severely eroded	SUND	Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes
IrCE	Ironmound-Coyle complex, 5 to 15 percent slopes	TelB	Teller loam, 1 to 3 percent slopes
IroC2	Ironmound loam, 3 to 5 percent slopes, eroded	TelC2	Teller loam, 3 to 5 percent slopes, eroded
KgfB	Kingfisher silt loam, 1 to 3 percent slopes	TriA	Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded
KinC2	Kingfisher loam, 3 to 5 percent slopes, eroded	URB	Urban land
KonB	Konawa loamy fine sand, 0 to 3 percent slopes	W	Water
KonD2	Konawa loamy fine sand, 3 to 8 percent slopes, eroded	YaaA	Yahola loam, 0 to 1 percent slopes, occasionally flooded
KrdA	Kirkland silt loam, 0 to 1 percent slopes	YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded
KrkB	Kirkland silty clay loam, 1 to 3 percent slopes	ZaHC	Zaneis-Huska complex, 3 to 5 percent slopes
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded	ZanB	Zaneis loam, 1 to 3 percent slopes
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded	ZanC	Zaneis loam, 3 to 5 percent slopes
LerA	Lebron clay, 0 to 1 percent slopes, occasionally flooded	ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded

CONVENTIONAL AND SPECIAL  
SYMBOLS LEGEND







CULTURAL FEATURES

BOUNDARIES	
County or parish	
Limit of soil survey (label) and/or denied access area	
Field sheet matchline & neatline (In white)	
LAND DIVISION CORNER (section and land grants)	
GEOGRAPHIC COORDINATE TICK	
TRANSPORTATION	
Divided roads	
ROAD EMBLEM & DESIGNATIONS	
Interstate	
Federal	
State	
RAILROAD	

HYDROGRAPHIC FEATURES

STREAMS	
Perennial, double line	
Perennial, single line	Label only
Drainage end	Label only

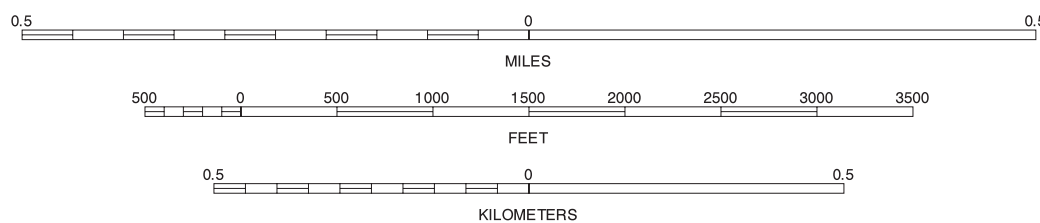
SPECIAL SYMBOLS FOR SOIL  
SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS	
AspA	GadA
EXCAVATIONS	
PITS	
Gravel pit	
Gully	
Mine or quarry	
MISCELLANEOUS SURFACE FEATURES	
Rock outcrop (includes sandstone and shale)	
Saline spot	
Sodic spot	





North American Datum of 1983 (NAD83). GRS-80 Spheroid  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.



INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





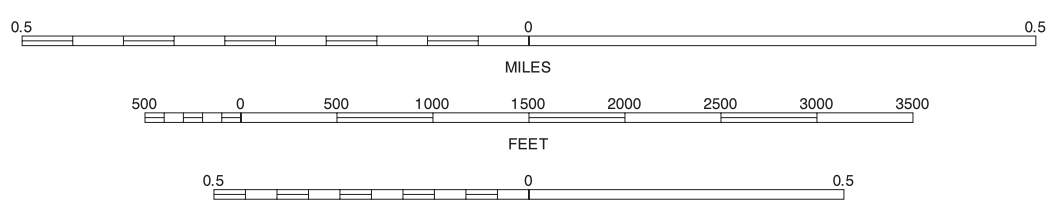
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION



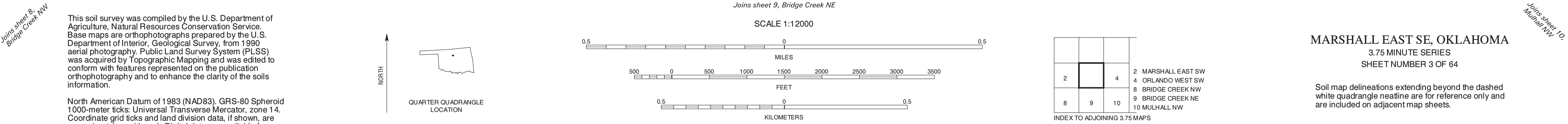
1	2	3
4	5	6
7	8	9

INDEX TO ADJOINING 3.75 MAPS

MARSHALL EAST SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 2 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid. 1000-meter ticks: Universal Transverse Mercator, zone 18N. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





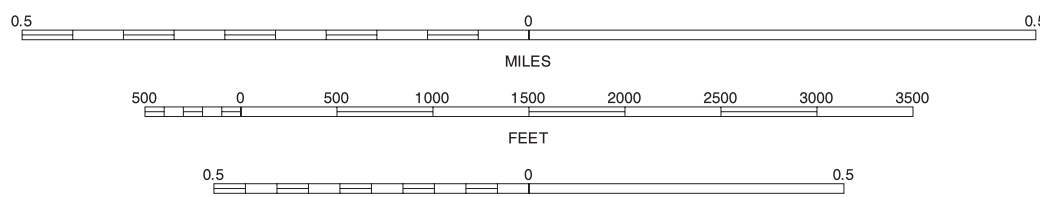
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION



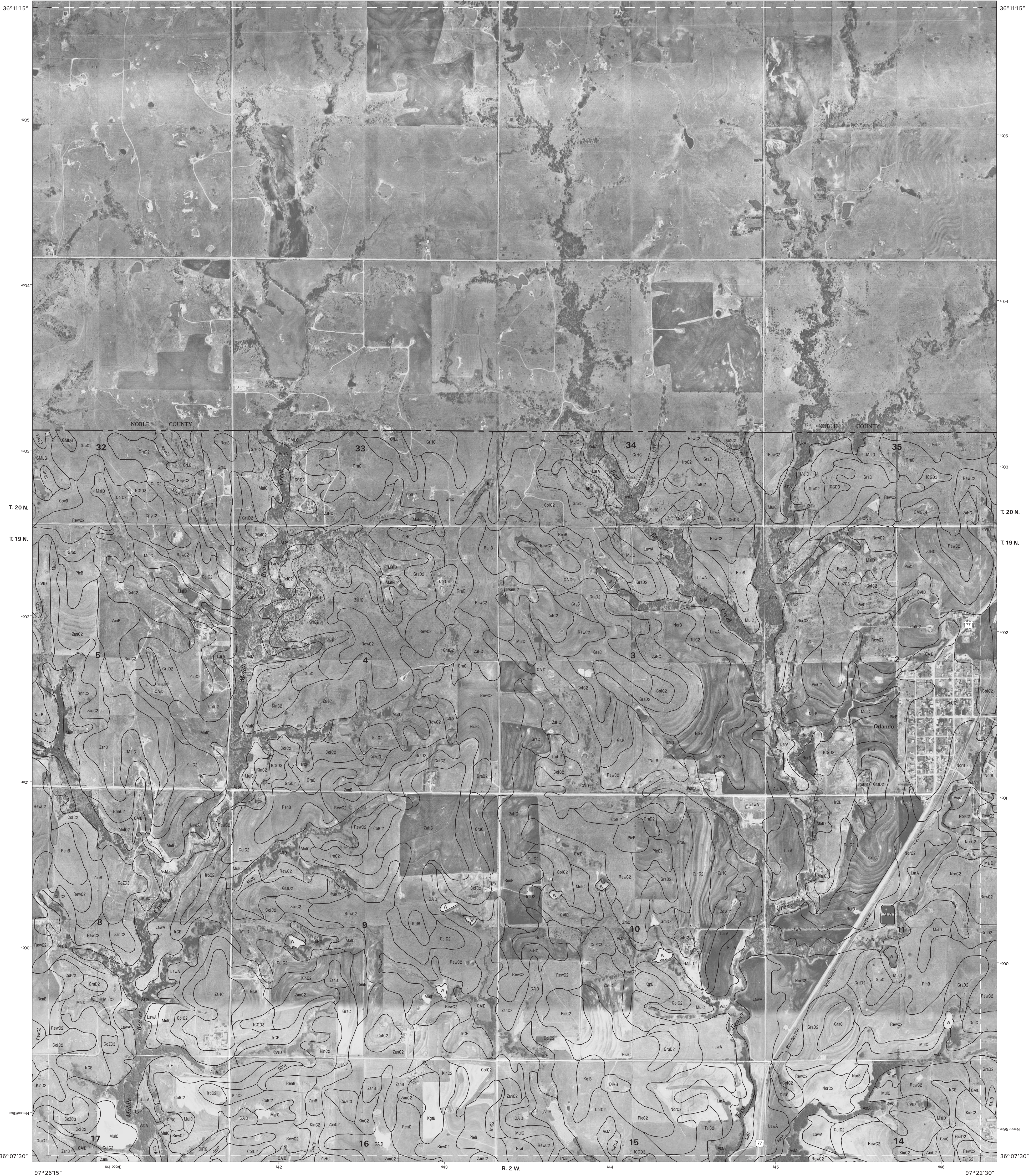
3	5
9	11

INDEX TO ADJOINING 3.75 MAPS

ORLANDO WEST SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 4 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.





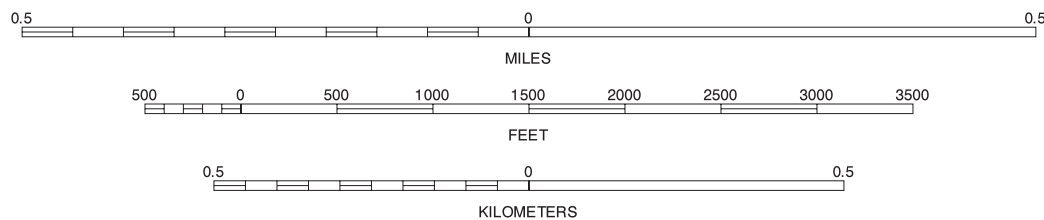
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



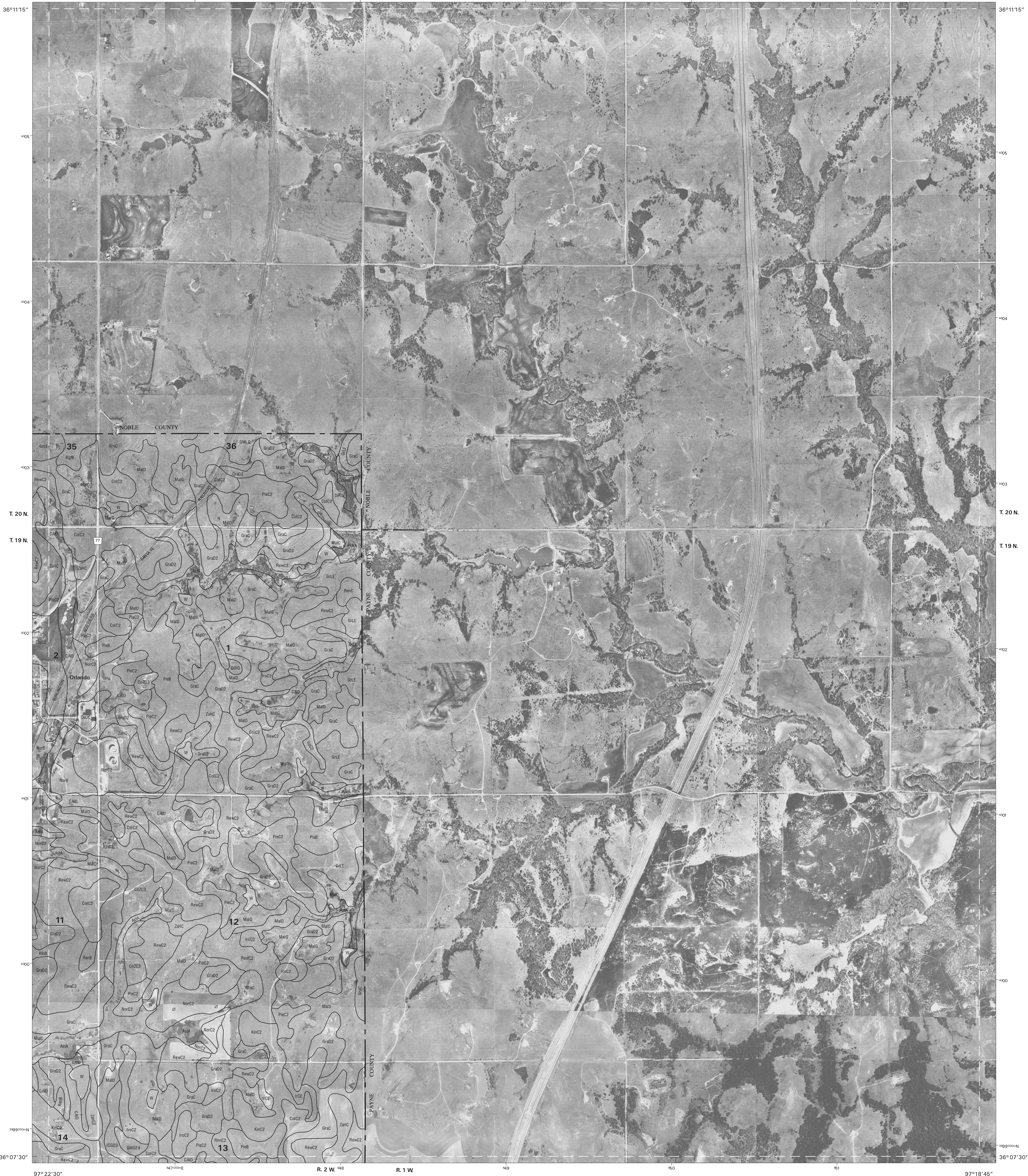
4	6
10	12

INDEX TO ADJOINING 3.75 MINUTE MAPS

ORLANDO WEST SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 5 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.





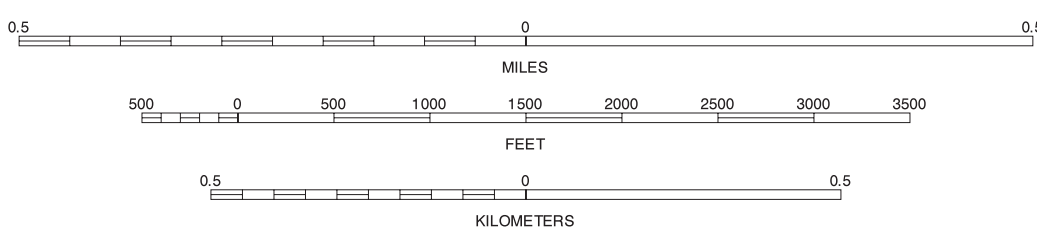
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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



5		5 ORLANDO WEST SE
11	12	11 MULHALL NE 12 CLEAR CREEK NW

INDEX TO ADJOINING 3.75 MAPS

ORLANDO EAST SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 6 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.





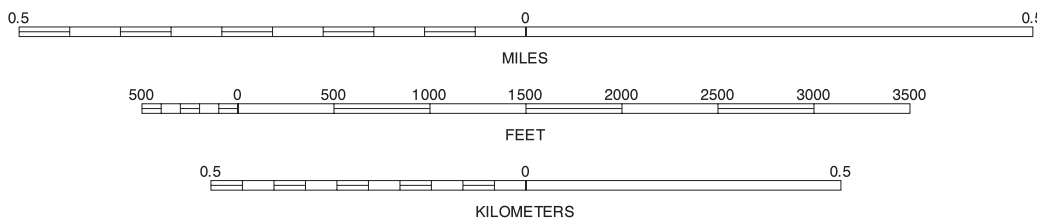
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



Joins sheet 13, Lovell SE

SCALE 1:12000

	1	2
	8	
13	14	

INDEX TO ADJOINING 3.75 MAPS

1 MARSHALL WEST SE  
2 MARSHALL EAST SW  
8 BRIDGE CREEK NW  
13 LOVELL SE  
14 BRIDGE CREEK SW

LOVELL NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 7 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



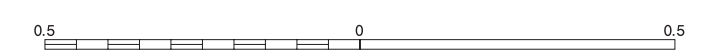


Joins sheet 13,  
Lovell SE

NORTH



SCALE 1:12000

INDEX TO ADJOINING 3.75 MAPS

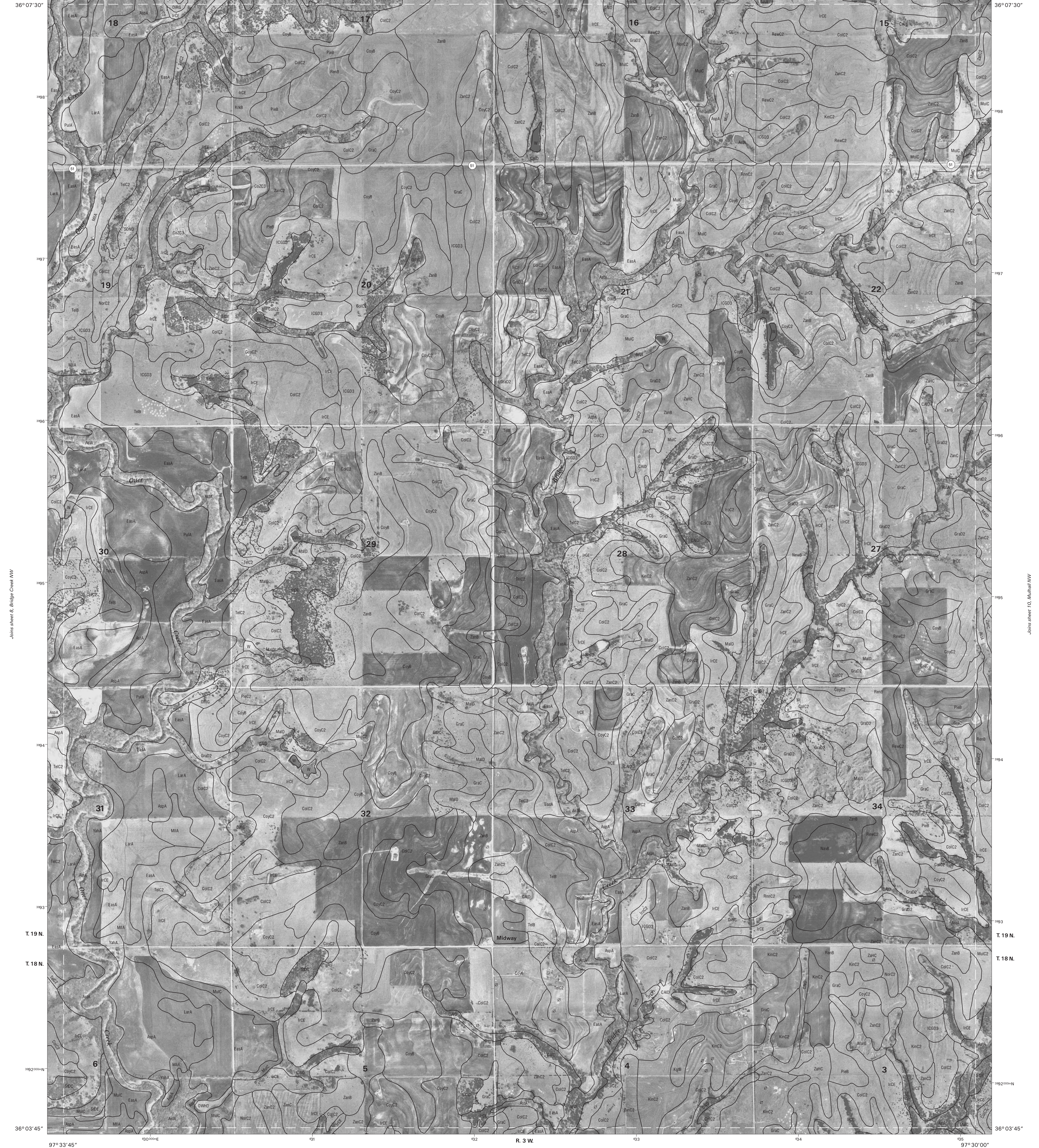
Joins sheet 15.  
Bridge Creek SE

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 2,  
Marshall East SW

Joins sheet 4,  
Orlando West SW



Joins sheet 6, Bridge Creek NW

Joins sheet 10, Mulhall NW

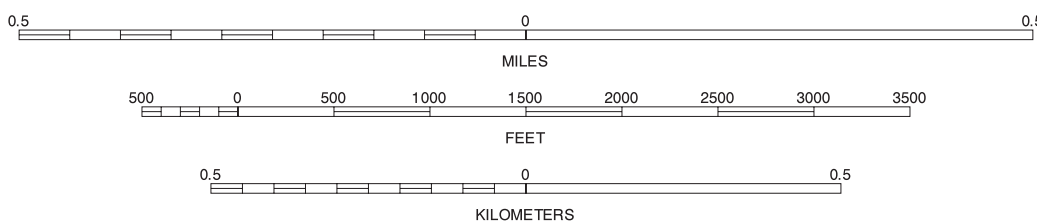
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



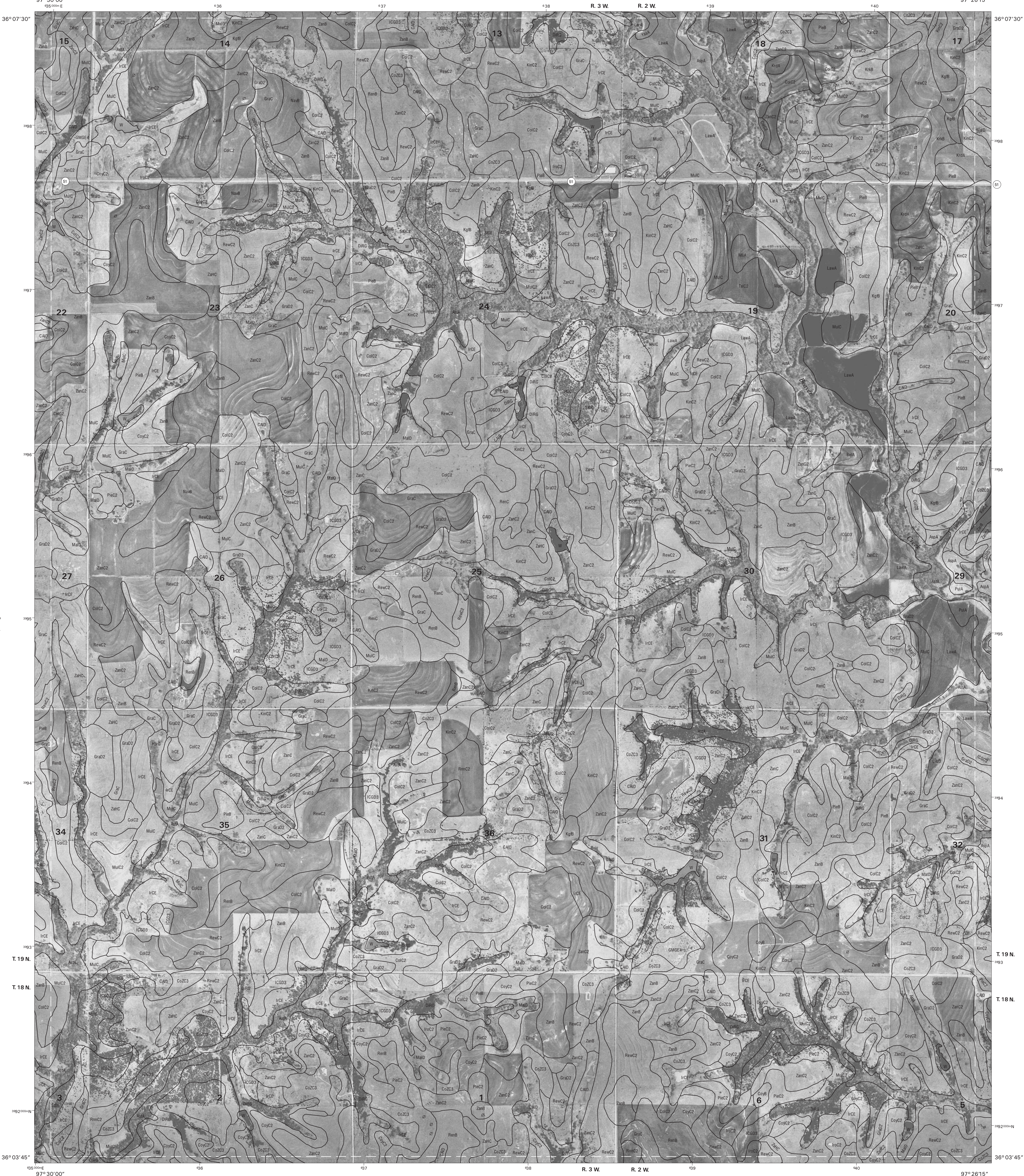
2	3	4
8		10
14	15	16

INDEX TO ADJOINING 3.75 MAPS

Joins sheet 14,  
Bridge Creek SW

Joins sheet 16,  
Mulhall SE





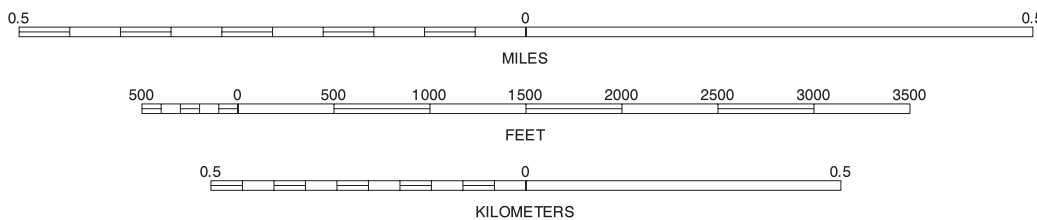
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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000

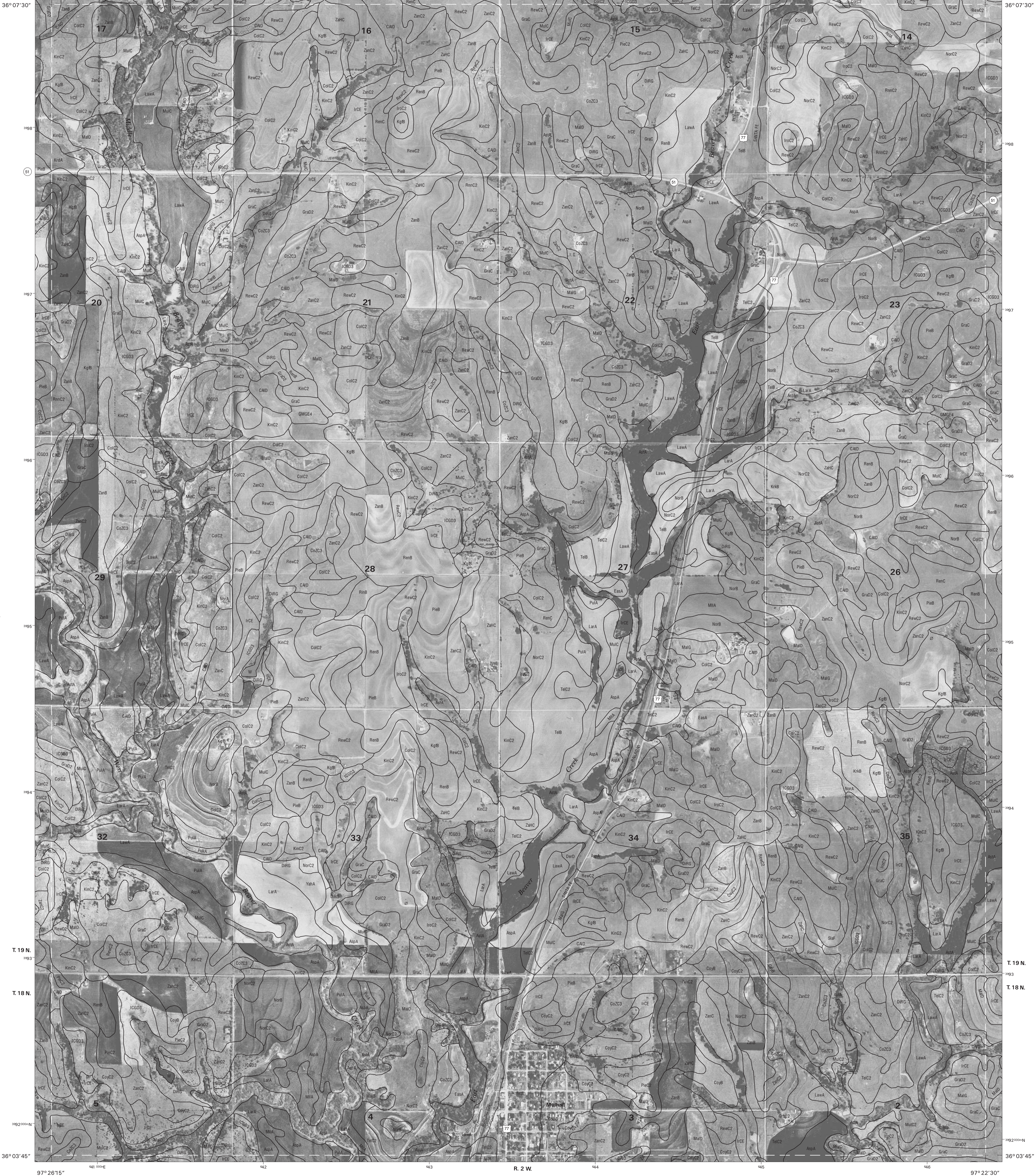
3	4	5
9	10	11
15	16	17

INDEX TO ADJOINING 3.75 MAPS

MULHALL NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 10 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



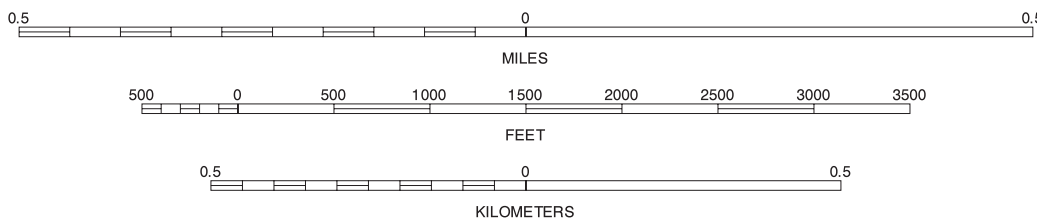


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE  
LOCATION



4	5	6
10	12	
16	17	18

INDEX TO ADJOINING MAPS

MULHALL NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 11 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



Joins sheet 5,  
Orlando West SE

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
97° 22' 30"

Joins sheet 6, Orlando East SW

LOGAN COUNTY, OKLAHOMA  
CLEAR CREEK NW QUADRANGLE  
SHEET NUMBER 12 OF 64  
97° 18' 45"

36° 07' 30"

36° 07' 30"

Joins sheet 11, Mulhall NE

T. 19 N.

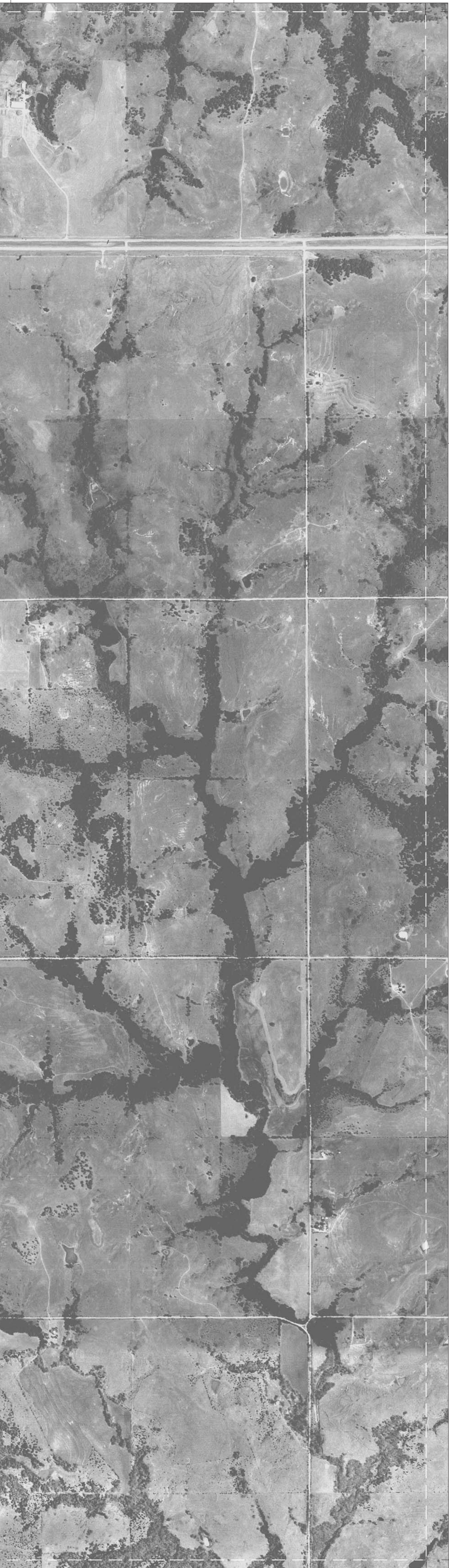
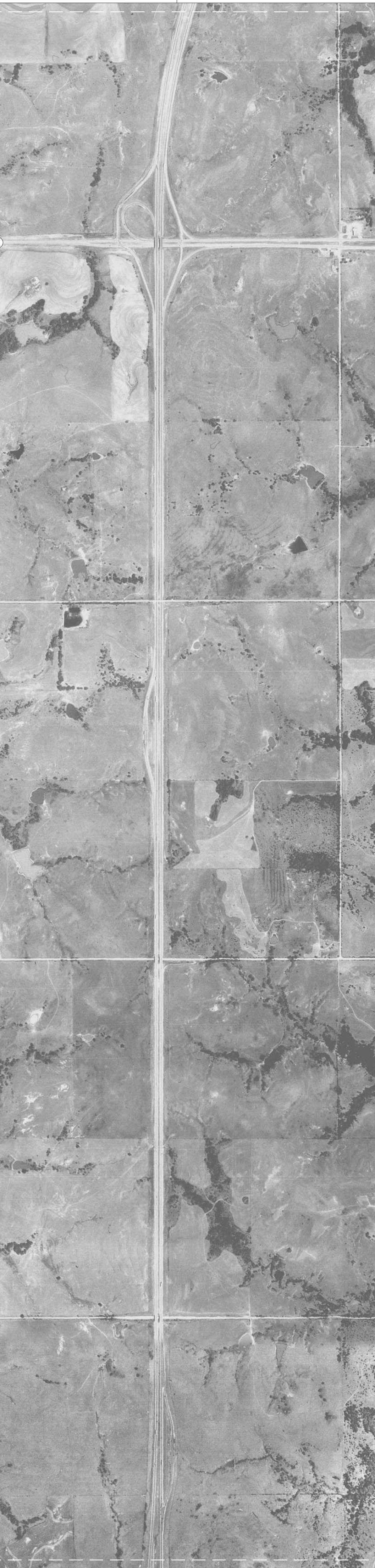
T. 19 N.

T. 18 N.

T. 18 N.

36° 03' 45"

36° 03' 45"



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

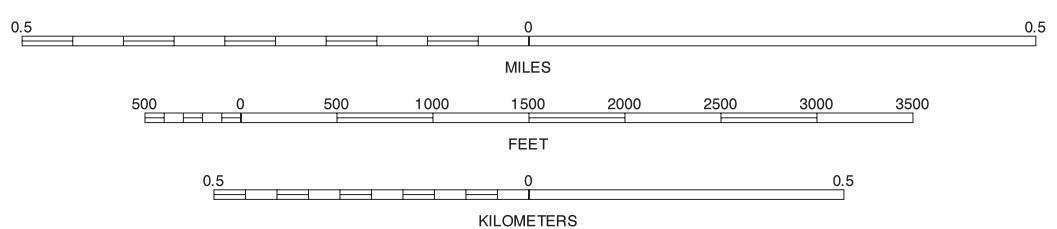
NORTH



QUARTER QUADRANGLE  
LOCATION

Joins sheet 18, Clear Creek SW

SCALE 1:12000



5	6	
11		
17	18	19

INDEX TO ADJOINING 3.75 MAPS

CLEAR CREEK NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 12 OF 64

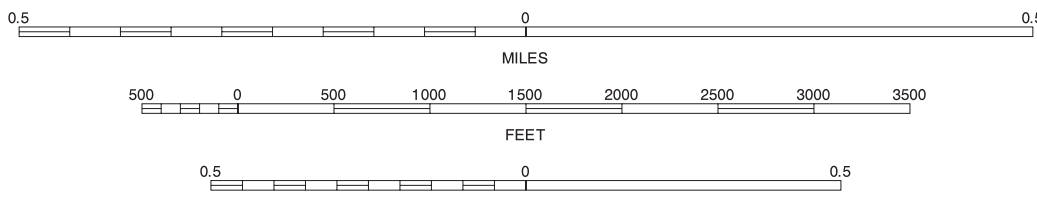
Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

Joins sheet 19,  
Clear Creek SE





North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



	7	8	7
			8
		14	1
	20	21	2
			2

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





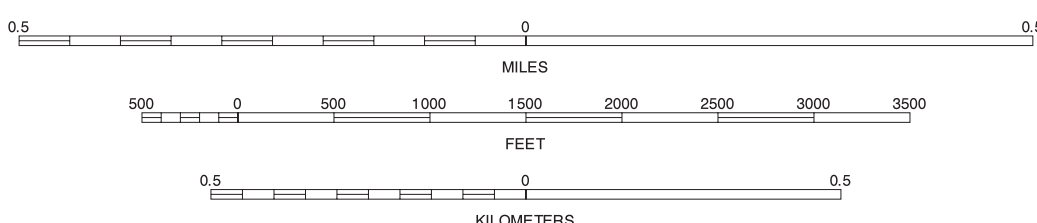
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000

7	8	9
13		15
20	21	22

INDEX TO ADJOINING 3.75 MAPS

7 LOVELL NE  
8 BRIDGE CREEK NW  
9 BRIDGE CREEK NE  
13 LOVELL SE  
15 BRIDGE CREEK SE  
20 CRESCENT NW NE  
21 CRESCENT NW  
22 CRESCENT NE

BRIDGE CREEK SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 14 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid  
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Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

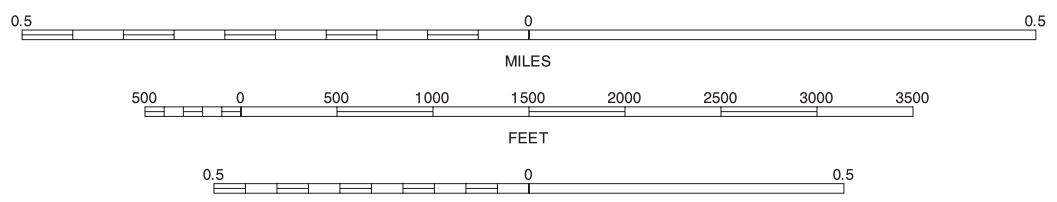
Joins sheet 21,  
Crescent NW

NORTH

QUARTER QUADR  
LOCATION

*Joins sheet 22, Crescent NE*

SCALE 1:12000



8	9	10	8 BRIDGE CREEK NW 9 BRIDGE CREEK NE 10 MULHALL NW
14		16	14 BRIDGE CREEK SW 16 MULHALL SW 21 CRESCENT NW
21	22	23	22 CRESCENT NE 23 GUTHRIE NORTH NW

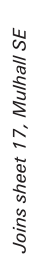
INDEX TO ADJOINING 3.75 MAPS

BRIDGE CREEK SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 15 OF 64

Soil map delineations extending beyond the dashed white quadrangle neckline are for reference only and are included on adjacent map sheets.

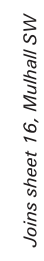
Joins sheet 25  
Guthrie North





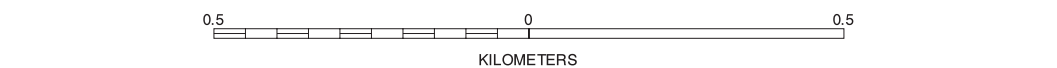
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





Joins sheet 23,  
Guthrie North A

Joins sheet 23,  
Guthrie North A



Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

bins sheet 25,  
Langston NW



Joins sheet 11,  
Mulhall NE

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

LOGAN COUNTY, OKLAHOMA  
CLEAR CREEK SW QUADRANGLE  
SHEET NUMBER 18 OF 64



Joins sheet 24,  
Guthrie North NE

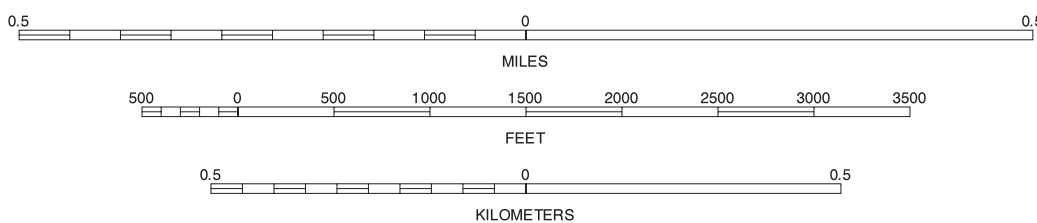
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



Joins sheet 25, Langston NW

SCALE 1:12000

11	12	
17		19
24	25	26

INDEX TO ADJOINING 3.75 MAPS

CLEAR CREEK SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 18 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.

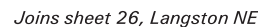
Joins sheet 25,  
Langston NE





Joins sheet 25,  
Langston NW

Joins sheet 25,  
Langston NW

12 CLEAR CREEK NW

Joins sheet 21  
Coyle NW

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



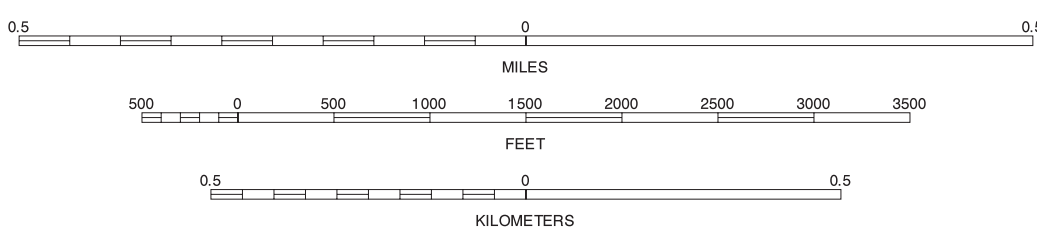
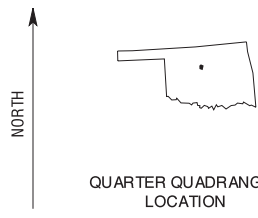
Joins sheet 13, Lovell SE

Joins sheet 14,  
Bridge Creek SW



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1930 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



13	14
21	21
29	30

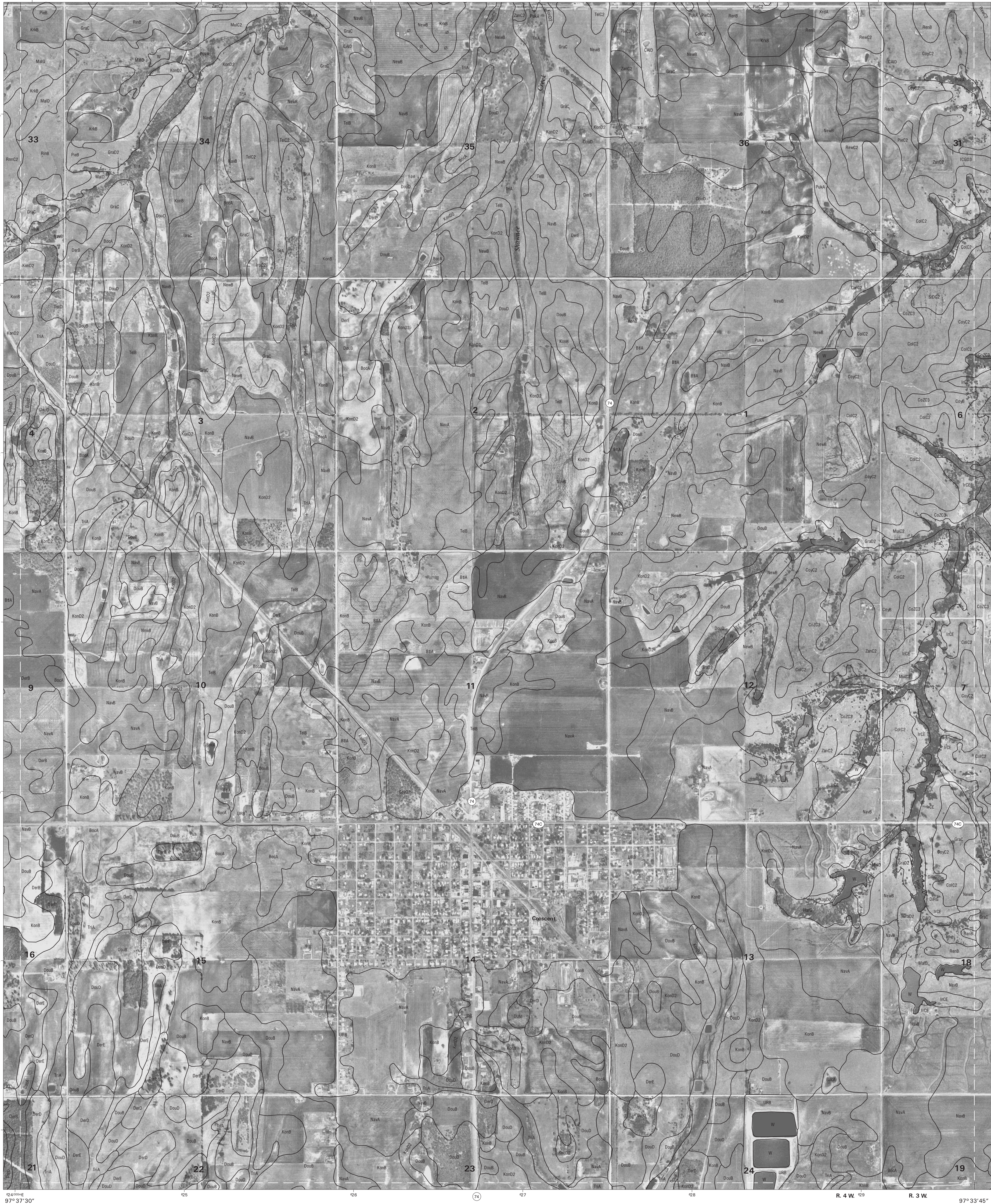
CRESCENT NW NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 20 OF 64

Soil map delineations extending beyond the dashed white quadrangle neoline are for reference only and are included on adjacent map sheets.

Joins sheet 21, Crescent NW

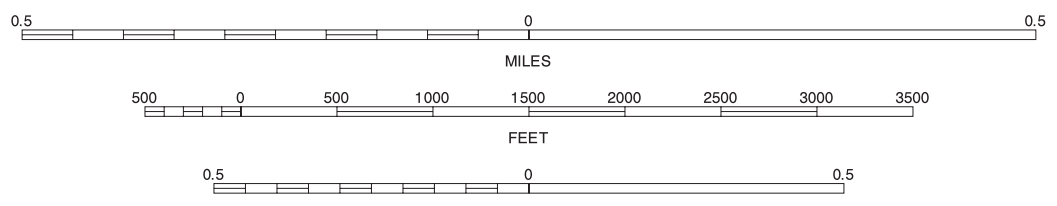
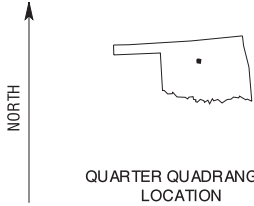
Joins sheet 20,  
Crescent SW





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



13	14	15
20	21	22
29	30	31

CRESCENT NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 21 OF 64

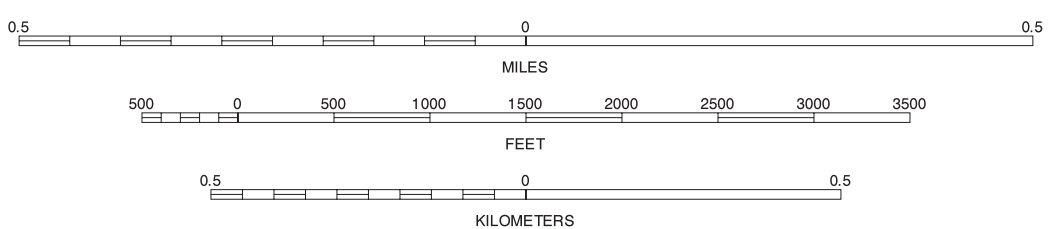
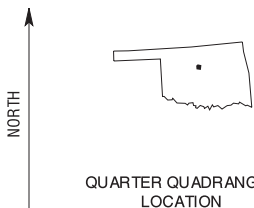
Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



14	15	16
21	22	23
30	31	32

INDEX TO ADJOINING 3.75 MAPS

CRESCENT NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 22 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.







Joins sheet 16,  
Mulhall SW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

LOGAN COUNTY, OKLAHOMA  
GUTHRIE NORTH NE QUADRANGLE  
SHEET NUMBER 24 OF 64

Joins sheet 18,  
Clear Creek SW

Joins sheet 17, Mulhall SE

R. 2 W.

Joins sheet 33, Guthrie North SE

SCALE 1:12000

R. 2 W.

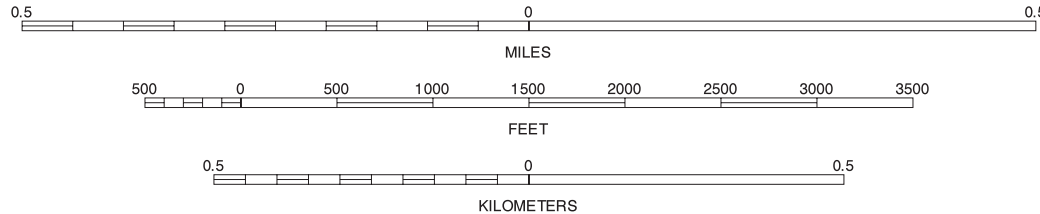
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1950 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



16	17	18
23	24	25
32	33	34

INDEX TO ADJOINING 3.75 MAPS

GUTHRIE NORTH NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 24 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.

Joins sheet 34,  
Langston SW



Joins sheet 17,  
Guthrie SE

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
97°22'30"

LOGAN COUNTY, OKLAHOMA  
LANGSTON NW QUADRANGLE  
SHEET NUMBER 25 OF 64  
97°18'45"

Joins sheet 19,  
Clear Creek SE

Joins sheet 18, Clear Creek SW



Joins sheet 24, Guthrie North NE

Joins sheet 26, Langston NE

Joins sheet 23,  
Guthrie North SE

Joins sheet 34, Langston SW

Joins sheet 35,  
Langston SE

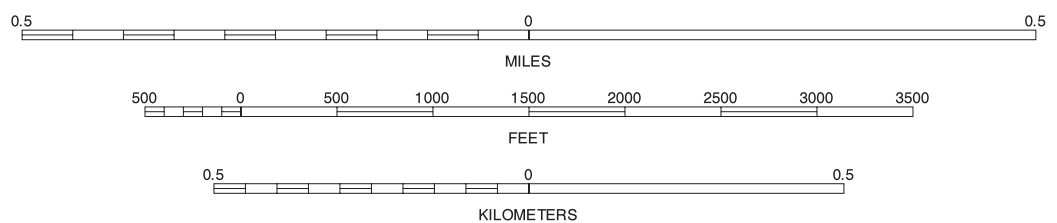
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1930 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



17	18	19
24	25	26
33	34	35

INDEX TO ADJOINING 3.75 MAPS

LANGSTON NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 25 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealline are for reference only and are included on adjacent map sheets.



Joins sheet 19,  
Clear Creek SW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 19, Clear Creek SE

LOGAN COUNTY, OKLAHOMA  
LANGSTON NE QUADRANGLE  
SHEET NUMBER 26 OF 64



Joins sheet 25, Langston NW

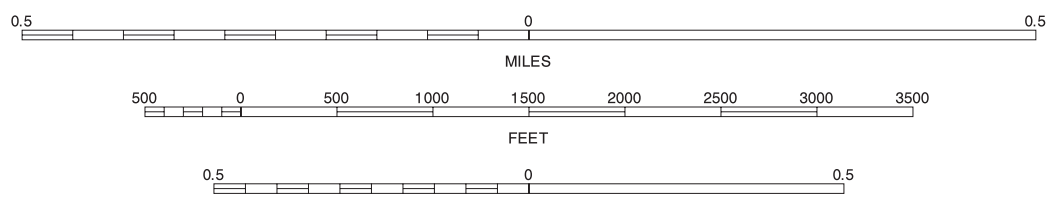
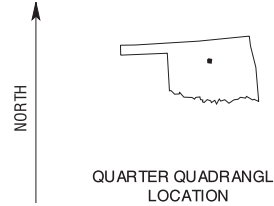
Joins sheet 27, Coyne NW

Joins sheet 24,  
Langston SW

Joins sheet 36,  
Coyne SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



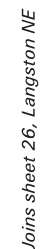
18	19	
25		27
34	35	36

18 CLEAR CREEK SW  
19 CLEAR CREEK SE  
25 LANGSTON NW  
27 COYLE NW  
34 LANGSTON SW  
35 LANGSTON SE  
36 COYLE SW

LANGSTON NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 26 OF 64

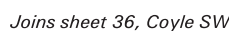
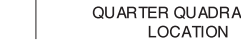
Soil map delineations extending beyond the dashed white quadrangle nealline are for reference only and are included on adjacent map sheets.





Joins sheet 30  
Langston SE

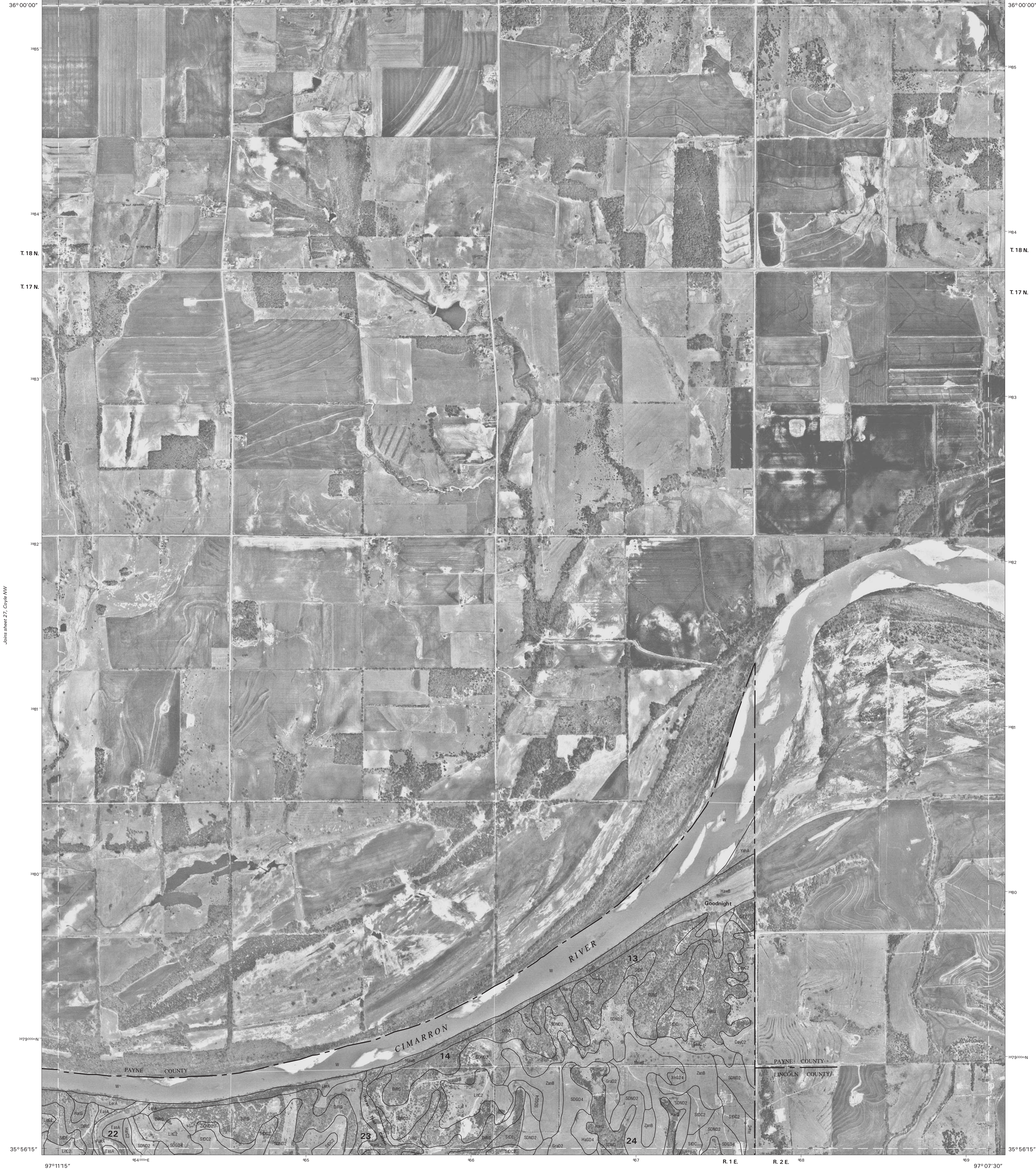
Joins sheet 30  
Langston SE

INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

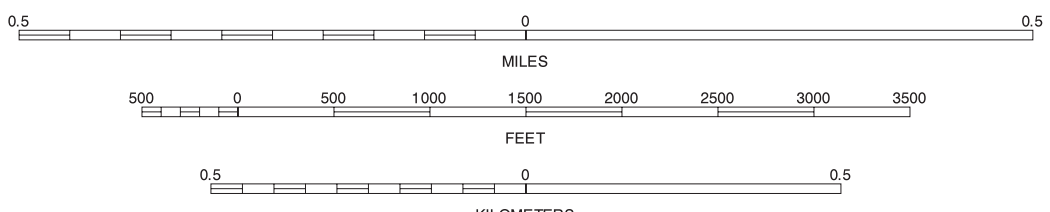
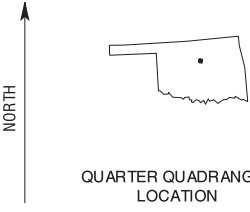
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



27	27 COYLE NW
36	36 COYLE SW
37	37 COYLE SE

INDEX TO ADJOINING 3.75 MAPS

COYLE NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 28 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealline are for reference only and are included on adjacent map sheets.



Joins sheet 20, Crescent NW NE

Joins sheet 21,  
Crescent NW



Joins sheet 30, Crescent SW

Joins sheet 30,  
Navaho NW

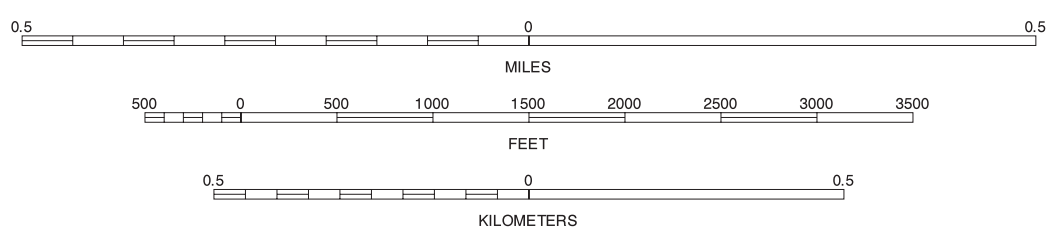
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000

Joins sheet 38, Cashion NE

	20	21	20 CRESCENT NW NE 21 CRESCENT NW
		30	30 CRESCENT SW
	38	39	38 CASHION NE 39 NAVAH NW

INDEX TO ADJOINING 3.75 MAPS

CRESCENT NW SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 29 OF 64

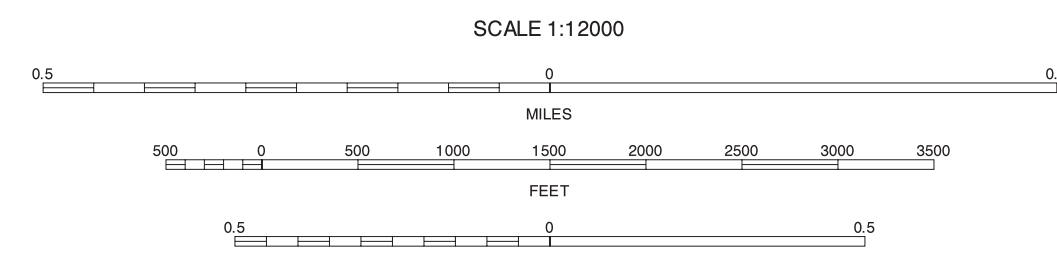
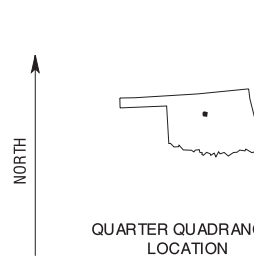
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



20	21	22
29	30	31
38	39	40

20 CRESCENT NW NE  
21 CRESCENT NW  
22 CRESCENT NE  
29 CRESCENT NW SE  
31 CRESCENT SE  
38 CASHION NE  
39 NAVINA NW  
40 NAVINA NE

INDEX TO ADJOINING 3.75 MAPS

CRESCENT SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 30 OF 64

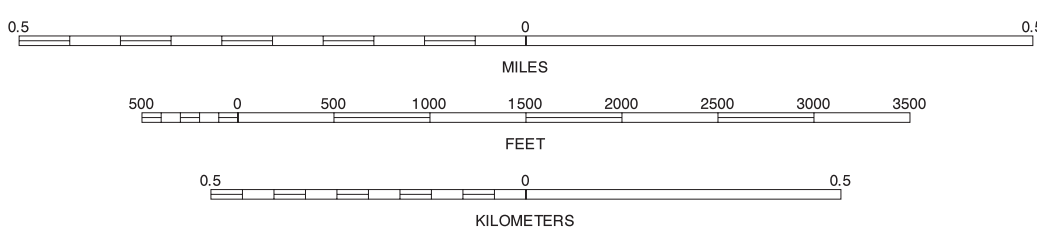
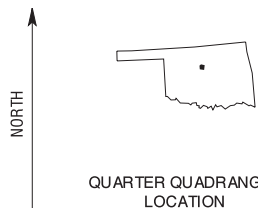
Soil map delineations extending beyond the dashed white quadrangle neatine are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



21	22	23
30	31	32
39	40	41

INDEX TO ADJOINING 3.75 MAPS

CRESCENT SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 31 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



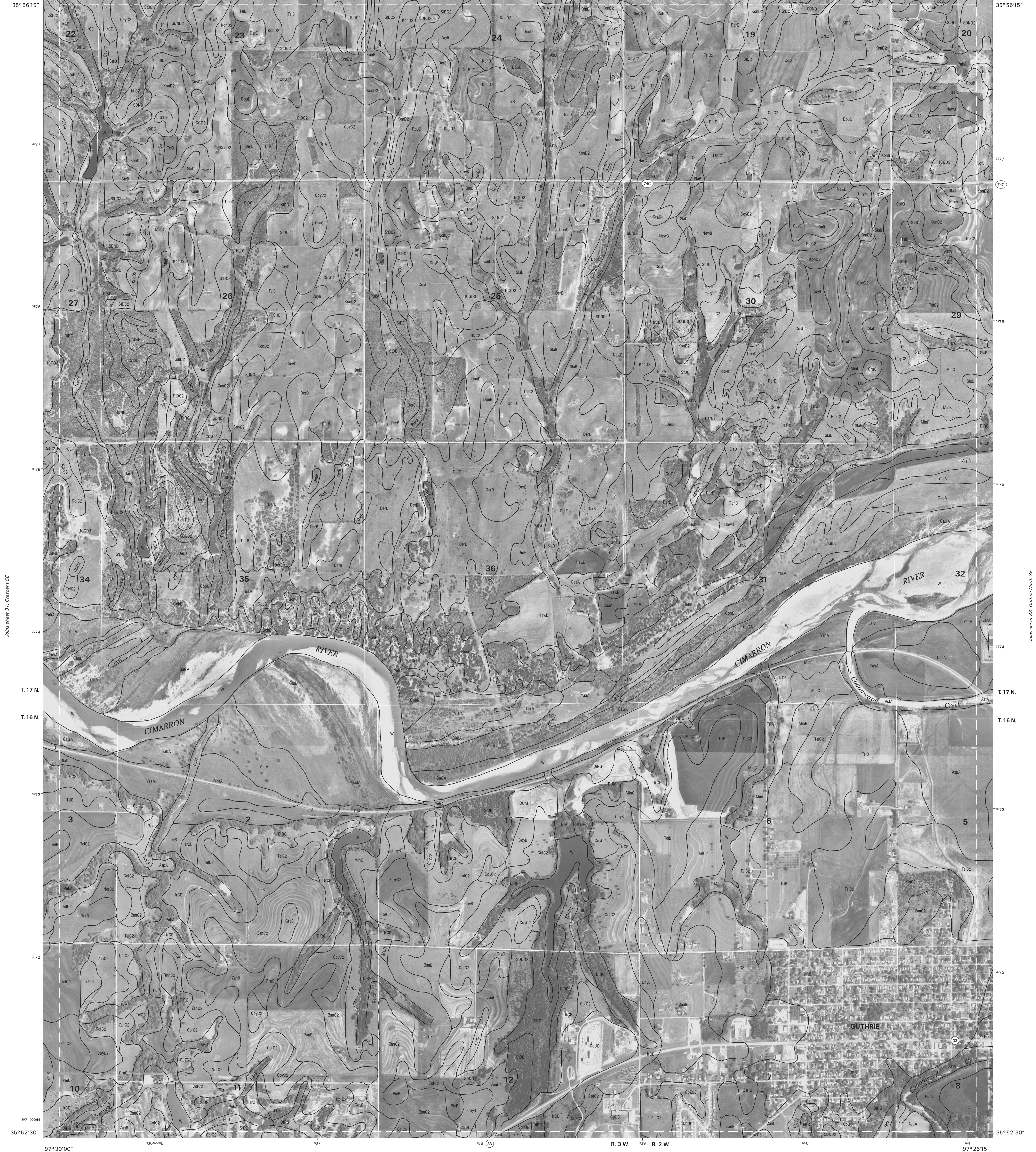
Joins sheet 22,  
Crescent NE

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
97°30'00"

Joins sheet 23, Guthrie North NW

LOGAN COUNTY, OKLAHOMA  
GUTHRIE NORTH SW QUADRANGLE  
SHEET NUMBER 32 OF 64  
97°26'15"

Joins sheet 24,  
Guthrie North NE



Joins sheet 31, Crescent SE

Joins sheet 33, Guthrie North SE

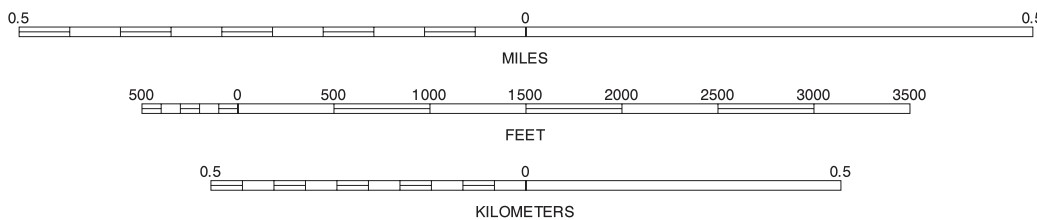
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



22	23	24	22 CRESCENT NE 23 GUTHRIE NORTH NW 24 GUTHRIE NORTH NE
31		33	31 CRESCENT SE 33 GUTHRIE NORTH SE 40 NAVANA NE
40	41	42	41 GUTHRIE SOUTH NW 42 GUTHRIE SOUTH NE

INDEX TO ADJOINING 3.75 MINUTE MAPS

GUTHRIE NORTH SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 32 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.

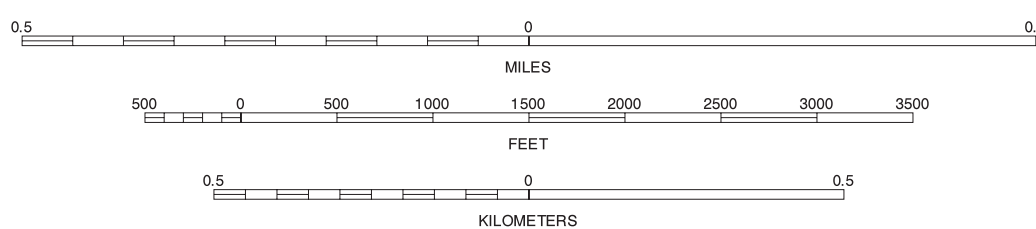
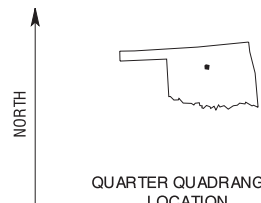
Joins sheet 42,  
Guthrie South NE





This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



23	24	25
32	33	34
41	42	43

INDEX TO ADJOINING 3.75 MAPS

GUTHRIE NORTH SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 33 OF 64

Soil map delineations extending beyond the dashed white quadrangle neoline are for reference only and are included on adjacent map sheets.

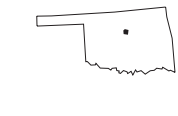




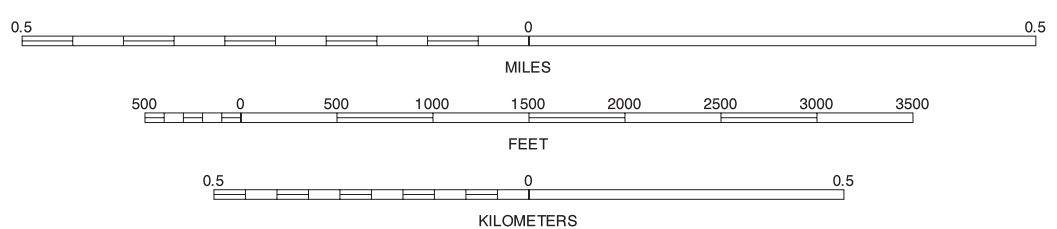
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

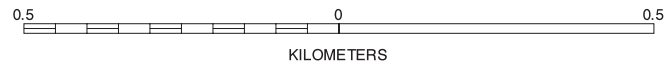
NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000



Joins sheet 43, Guthrie SE NW

24	25	26
33	34	35
42	43	44

INDEX TO ADJOINING 3.75 MAPS

LANGSTON SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 34 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

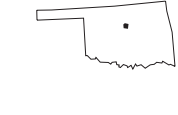




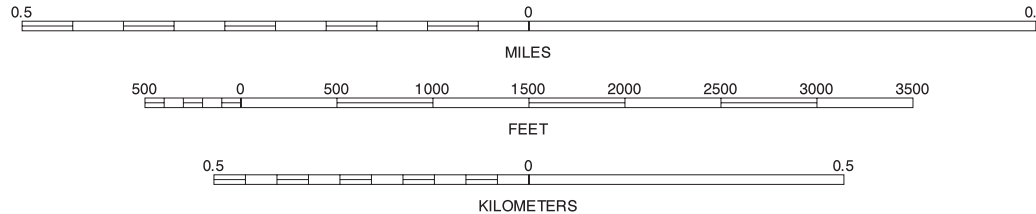
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000

Joins sheet 44, Guthrie SE NE

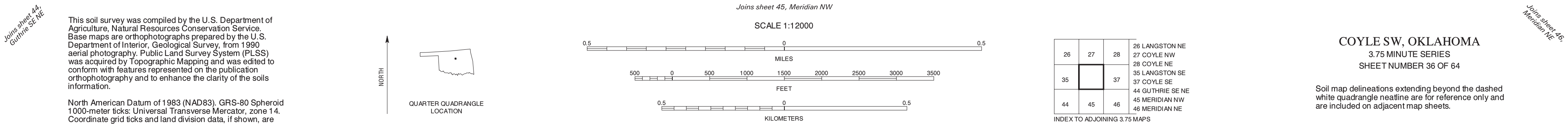
25	26	27
34	35	36
43	44	45

INDEX TO ADJOINING 3.75 MAPS

LANGSTON SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 35 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 27,  
Coyle NW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
97°11'15"

LOGAN COUNTY, OKLAHOMA  
COYLE SE QUADRANGLE  
SHEET NUMBER 37 OF 64  
97°07'30"

Joins sheet 28, Coyle NE

R. 1 E.

R. 2 E.

35°56'15"

35°56'15"

T. 17 N.

T. 17 N.

T. 16 N.

T. 16 N.

35°52'30"

35°52'30"

R. 1 E.

R. 2 E.

97°07'30"

Joins sheet 36, Coyle SW

Joins sheet 45,  
Meridian NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

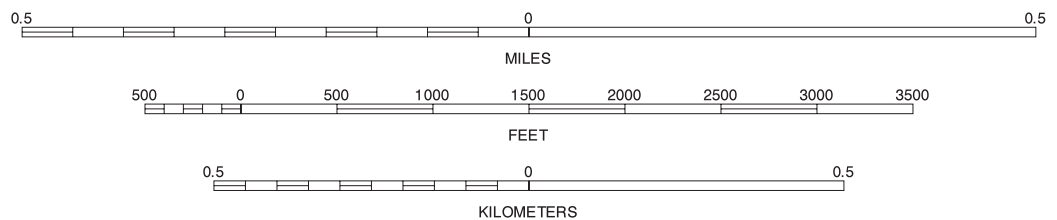
NORTH



QUARTER QUADRANGLE  
LOCATION

Joins sheet 46, Meridian NE

SCALE 1:12000



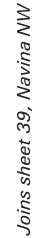
27	28		27 COYLE NW
			28 COYLE NE
36			36 COYLE SW
			45 MERIDIAN NW
45	46		46 MERIDIAN NE

INDEX TO ADJOINING 3.75 MAPS

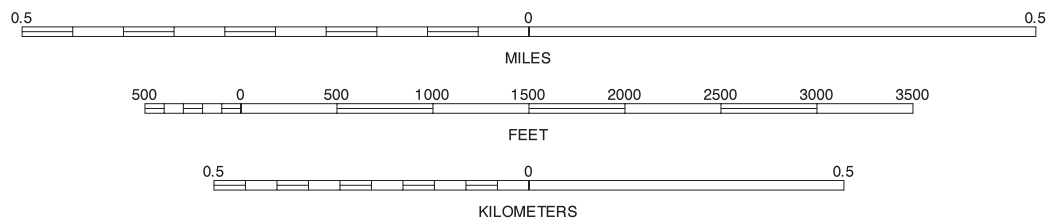
COYLE SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 37 OF 64

Soil map delineations extending beyond the dashed white quadrangle neckline are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.



	29	30	29 CRESCENT NW SE 30 CRESCENT SW
		39	39 NAVINA NW
	47	48	47 CASHION SE 48 NAVINA SW

INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

ms sheet 48,  
Navina SW



Joins sheet 30, Crescent SW

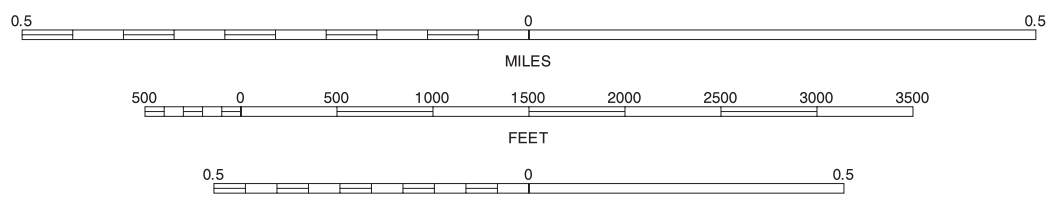
Joins sheet 31, Crescent SE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



INDEX TO ADJOINING 3.75 MAPS

29	30	31
38	39	40
47	48	49

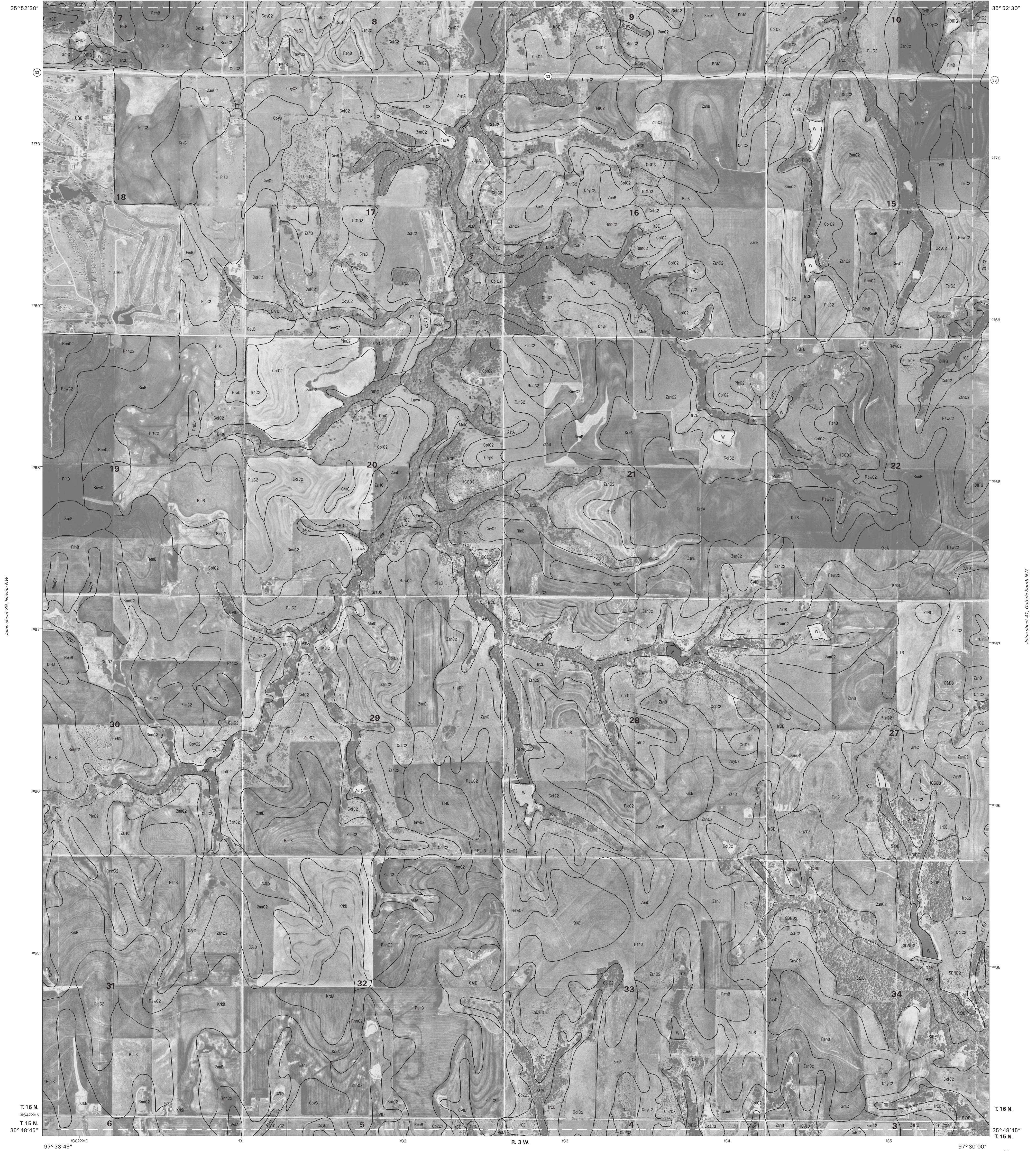
NAVINA NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 39 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.



Joins sheet 30,  
Crescent SW

Joins sheet 22,  
Guthrie North SW



Joins sheet 48,  
Navina SW

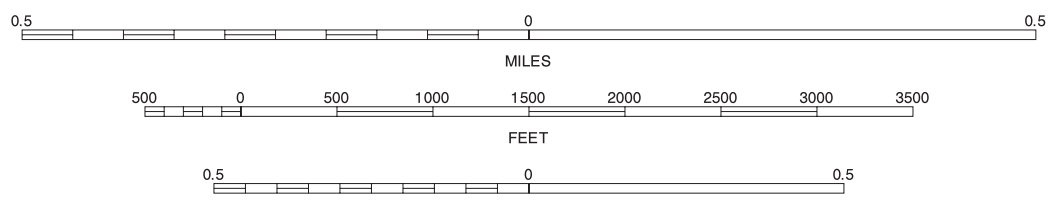
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



Joins sheet 49, Navina SE

SCALE 1:12000

30	31	32
39	40	41
48	49	50

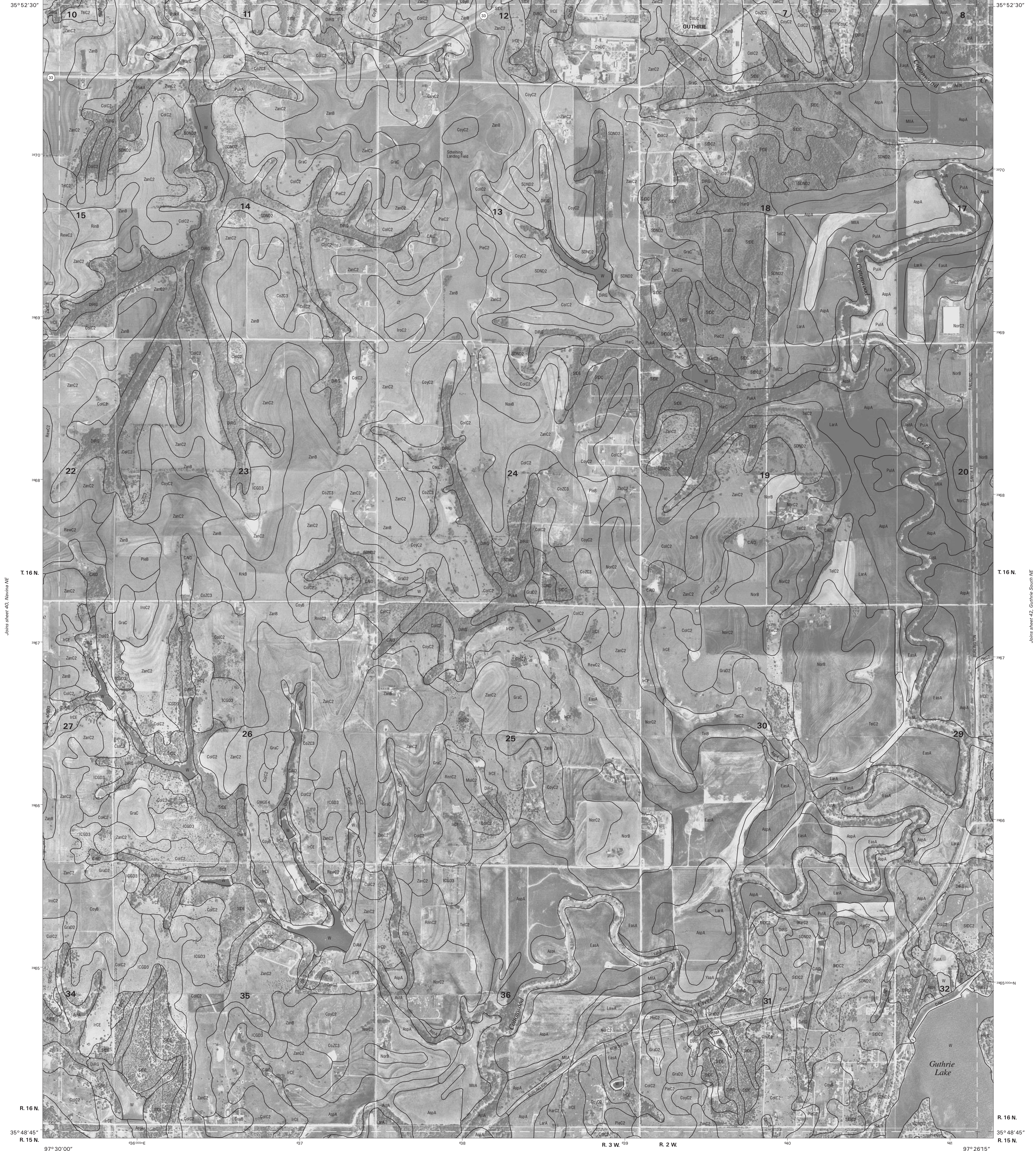
INDEX TO ADJOINING 3.75 MAPS

NAVINA NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 40 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealline are for reference only and are included on adjacent map sheets.

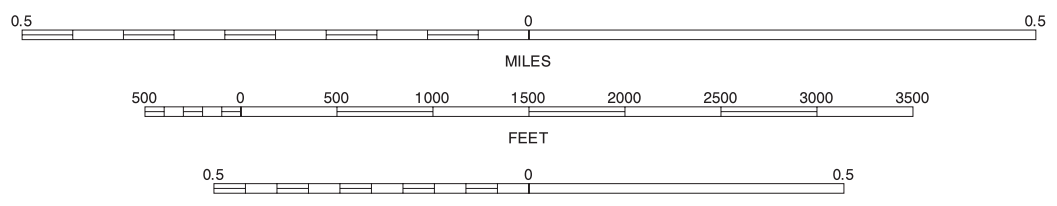
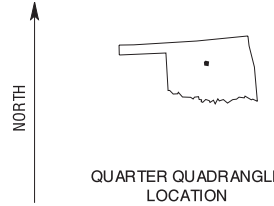
Joins sheet 50,  
Guthrie South SW





This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1980 aerial photography. Public Land Survey System (PLSS) was acquired by Topographic Mapping and was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



31	32	33
40	42	
49	50	51

GUTHRIE SOUTH NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 41 OF 64

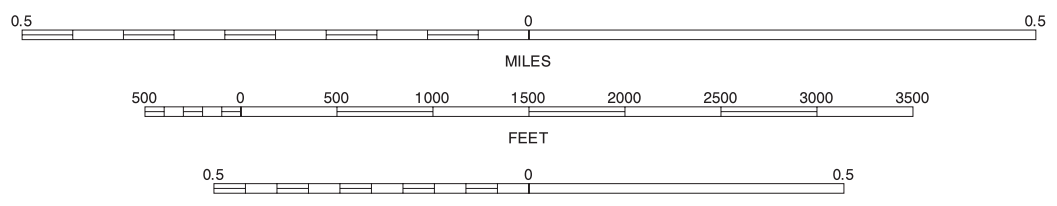
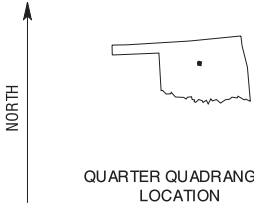
Soil map delineations extending beyond the dashed white quadrangle nealines are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



32	33	34
41		43
50	51	52

GUTHRIE SOUTH NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 42 OF 64

Soil map delineations extending beyond the dashed white quadrangle neckline are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

Joins sheet 53,  
Guthrie SE SE

33	34	35	33 GUTHRIE NORTH SE
			34 LANGSTON SW
			35 LANGSTON SE
42		44	42 GUTHRIE SOUTH NE
			44 GUTHRIE SE NE
			51 GUTHRIE SOUTH SE
51	52	53	52 GUTHRIE SE SW
			53 GUTHRIE SE SE

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 35, Langston SE

R. 1 W.

Joins sheet 53, Guthrie SE SE

SCALE 1:12000

GUTHRIE SE NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 44 OF 64

Soil map delineations extending beyond the dashed white quadrangle nealtine are for reference only and are included on adjacent map sheets.

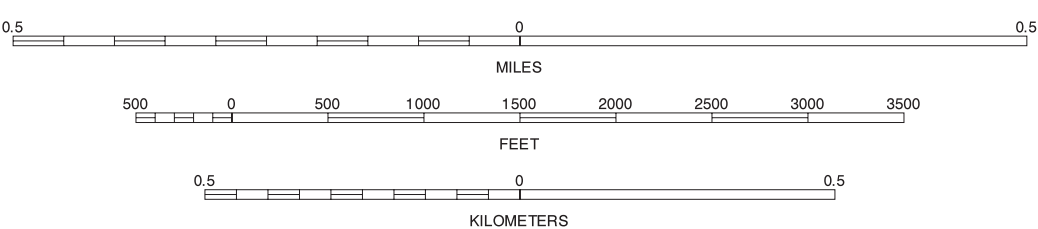
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

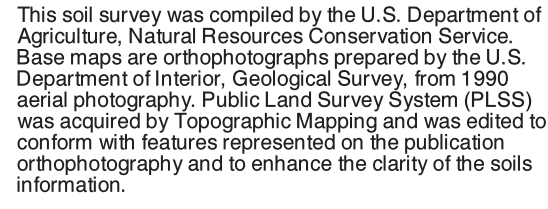


34	35	36
43		45
52	53	54

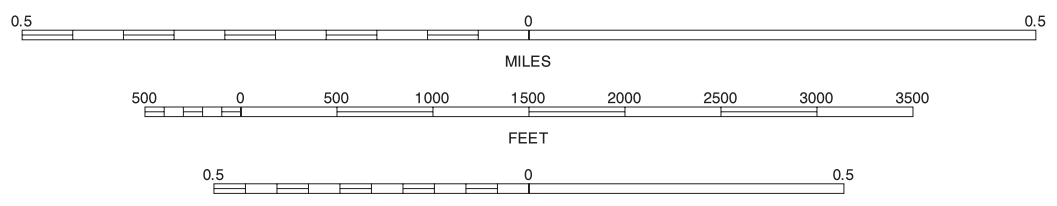
34 LANGSTON SW  
35 LANGSTON SE  
36 COYLE SW  
43 GUTHRIE SE NW  
45 MERIDIAN NW  
52 GUTHRIE SE SW  
53 GUTHRIE SE SE  
54 MERIDIAN SW

INDEX TO ADJOINING 3.75 MAPS





QUARTER QUADRANGLE  
LOCATION



35	36	37	3
44		46	4
53	54	55	5

MERIDIAN NW, OKLAHOMA  
 3.75 MINUTE SERIES  
 SHEET NUMBER 45 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



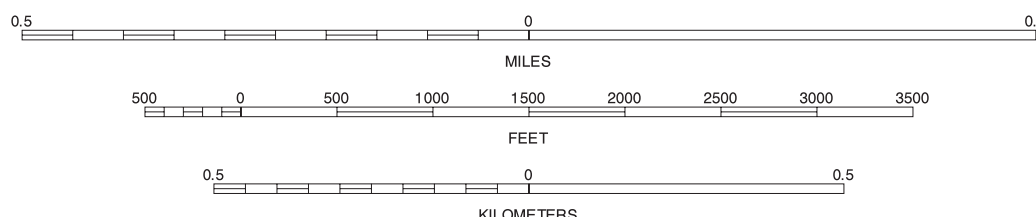


NORTH

QUARTER QUADRANG

ns sheet 55, Meridian SE

SCALE 1:12000



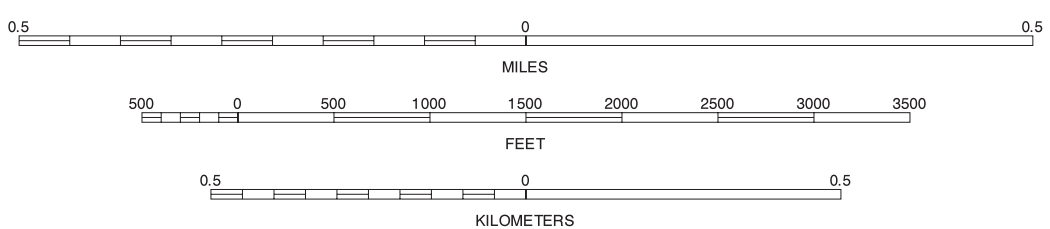
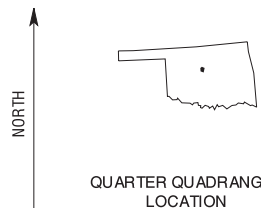
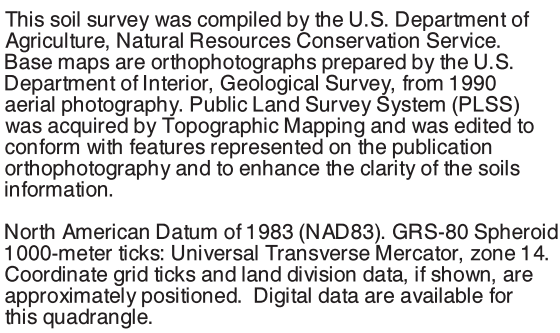
36	37	36 COYLE SW 37 COYLE SE
45		45 MERIDIAN NW
54	55	54 MERIDIAN SW 55 MERIDIAN SE

INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





	38	39	38 CASHION NE 39 NAVINA NW
		48	48 NAVINA SW
	56	57	56 PIEDMONT NE 57 BETHANY NE NW

INDEX TO ADJOINING 3.75 MAPS

CASHION SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 47 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



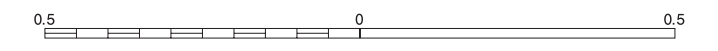


Joins sheet 56,  
Piedmont NE

NORTH



SCALE 1:12000



Joins sheet 58,  
Bethany NE NE

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 39,  
Navina NW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 40, Navina NE

LOGAN COUNTY, OKLAHOMA  
NAVINA SE QUADRANGLE  
SHEET NUMBER 49 OF 64

Joins sheet 11,  
Guthrie South NW



Joins sheet 46, Navina SW

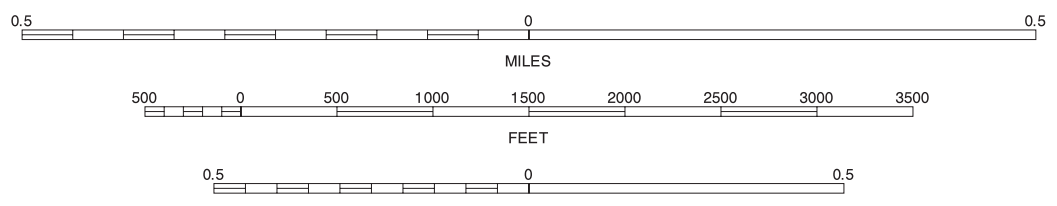
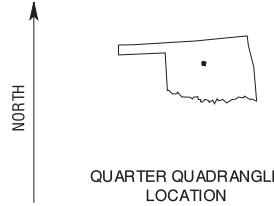
Joins sheet 50, Guthrie South SW

Joins sheet 57,  
Bethany NE NW

Joins sheet 59,  
Edmond NW

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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



39	40	41
48	49	50
57	58	59

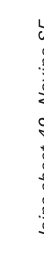
39 NAVINA NW  
40 NAVINA NE  
41 GUTHRIE SOUTH NW  
48 NAVINA SW  
49 GUTHRIE SOUTH SW  
57 BETHANY NE NW  
58 BETHANY NE NE  
59 EDMOND NW

NAVINA SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 49 OF 64

Soil map delineations extending beyond the dashed white quadrangle neeline are for reference only and are included on adjacent map sheets.

INDEX TO ADJOINING 3.75 MAPS





pins sheet 51, Guthrie South S

Joins sheet 58,  
Bethany NE NE

LOCATION

0

100 1500 3

0

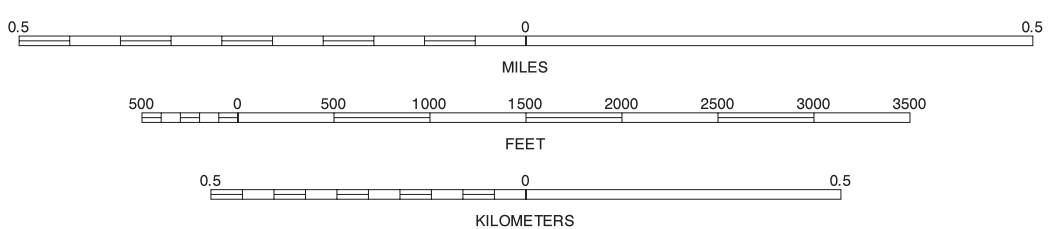
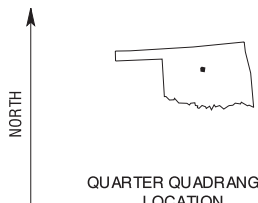
INDEX TO ADJOINING 3.75 MAPS

Joins sheet 60,  
Edmond NE



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41	42	43
50	51	52
59	60	61

INDEX TO ADJOINING 3.75 MAPS

41 GUTHRIE SOUTH NW  
42 GUTHRIE SOUTH NE  
43 GUTHRIE SE NW  
50 GUTHRIE SOUTH SW  
52 GUTHRIE SE SW  
59 EDMOND NW  
60 EDMOND NE  
61 ARCADIA NW





Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



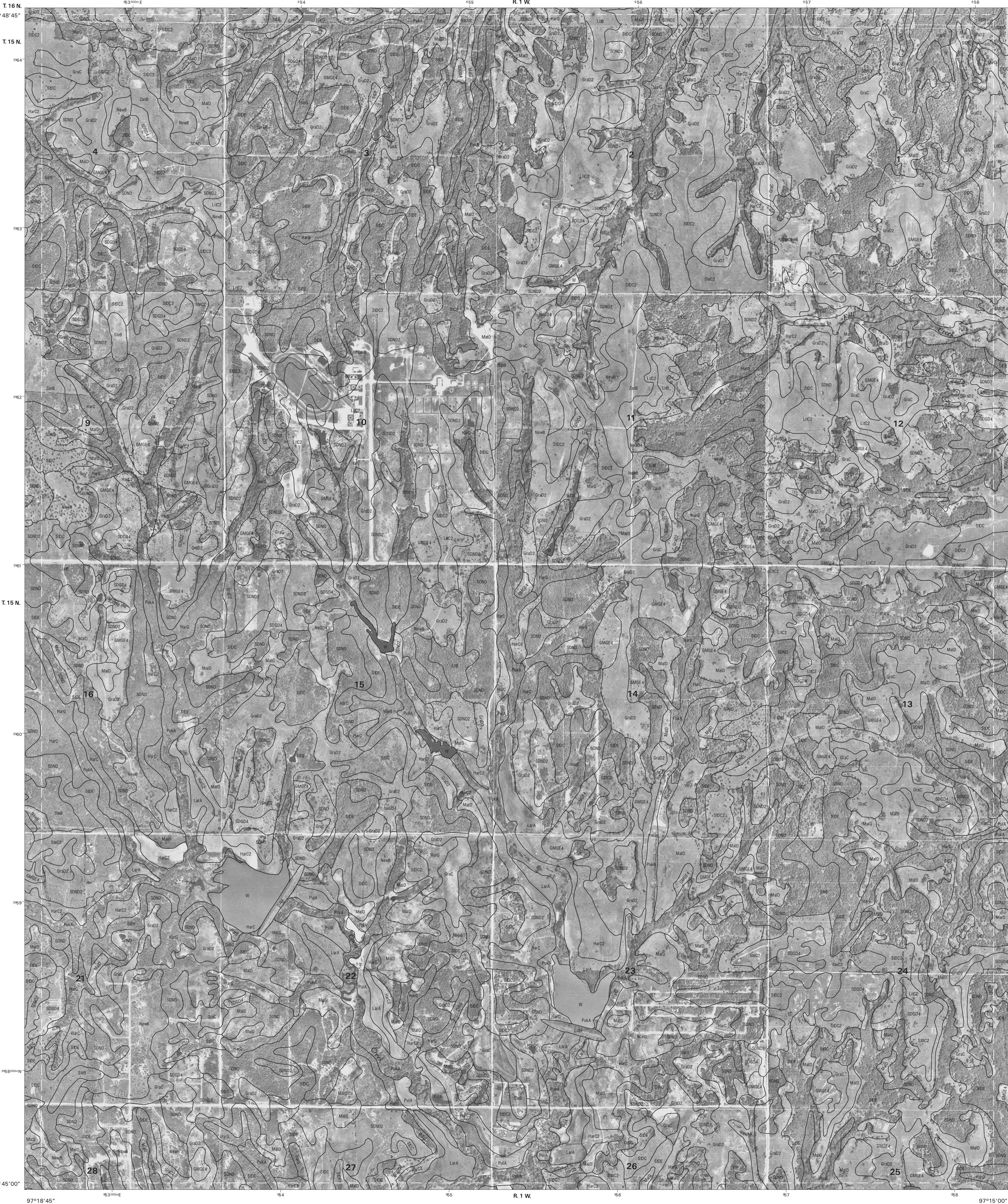
Joins sheet 43  
Guthrie SE NW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

LOGAN COUNTY, OKLAHOMA  
GUTHRIE SE SE QUADRANGLE  
SHEET NUMBER 53 OF 64

Joins sheet 45,  
Meridian NW

Joins sheet 44, Guthrie SE NE



Joins sheet 62, Guthrie SE SW

Joins sheet 64, Meridian SW

Joins sheet 61,  
Arcadia NW

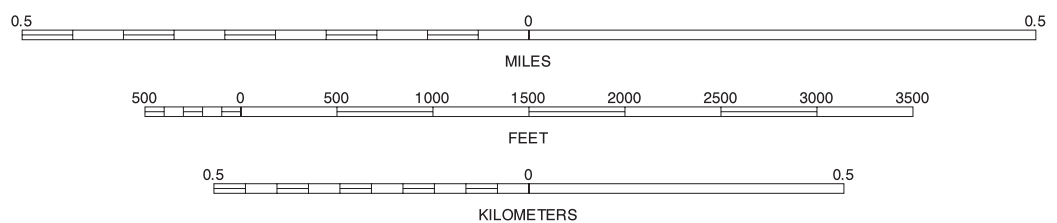
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



SCALE 1:12000

43	44	45
52	54	
61	62	63

INDEX TO ADJOINING 3.75 MAPS

GUTHRIE SE SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 53 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

Joins sheet 63,  
Luther NW



*Joins sheet 45. Meridian NW*

Joins sheet 46,  
Meridian NE

Joins sheet 44,  
Guthrie SE NE

*Joins sheet 55, Meridian SE*

*Joins sheet 53, Guthrie SE SE*

Joins sheet 64,  
Luther NE

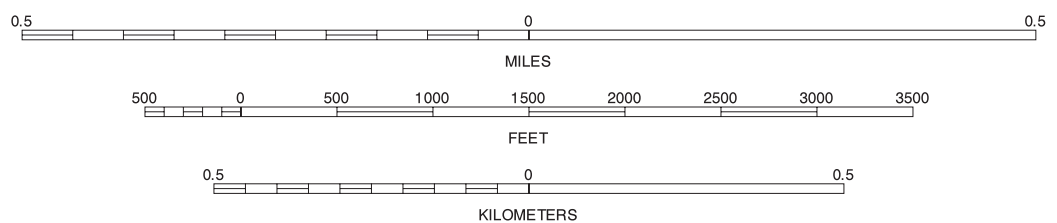
Joins sheet 62,  
Arcadia NE

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANG  
LOCATION

SCALE 1:12000



44	45	46	44 GUTHRIE SE NE 45 MERIDIAN NW 46 MERIDIAN NE
53		55	53 GUTHRIE SE SE 55 MERIDIAN SE 62 ARCADIA NE
62	63	64	63 LUTHER NW 64 LUTHER NE

INDEX TO ADJOINING 3.75 MAPS

MERIDIAN SW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 54 OF 64

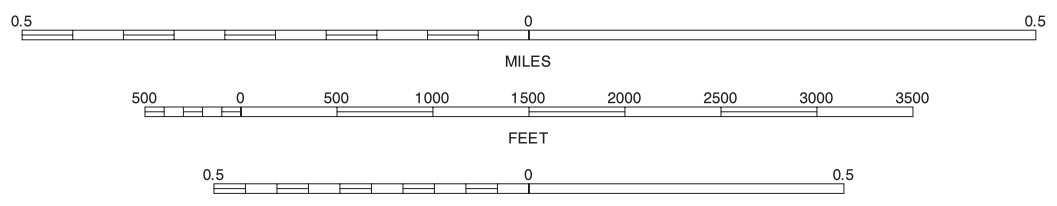
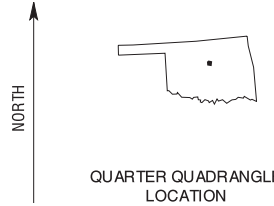
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



45	46
54	55
63	64

MERIDIAN SE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 55 OF 64

Soil map delineations extending beyond the dashed white quadrangle neckline are for reference only and are included on adjacent map sheets.





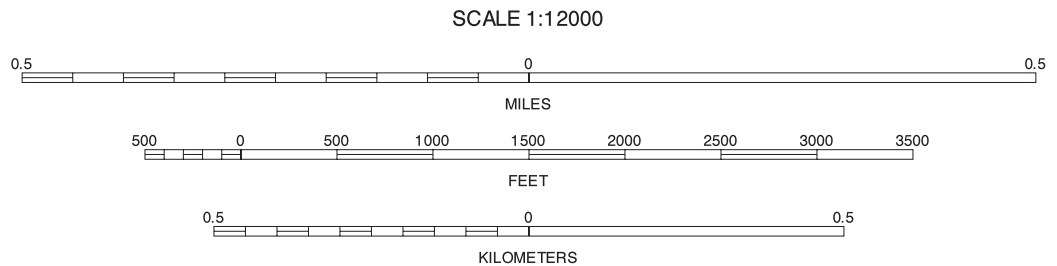
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



47	48
47 CASHION SE	48 NAVINA SW
57	57 BETHANY NE NW

INDEX TO ADJOINING 3.75 MAPS

PIEDMONT NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 56 OF 64

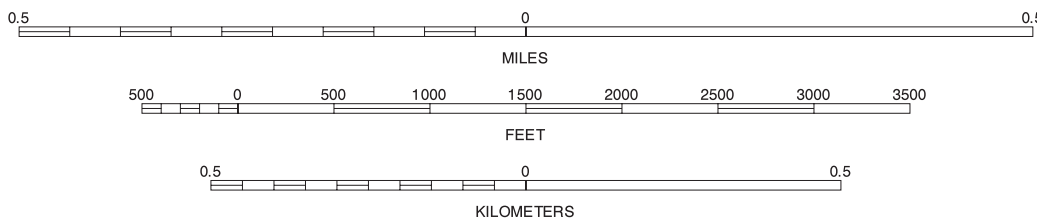
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



North American Datum of 1983 (NAD83). GRS-80 Spheroid.  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

QUARTER QUADRANG  
LOCATION

SCALE 1:12000

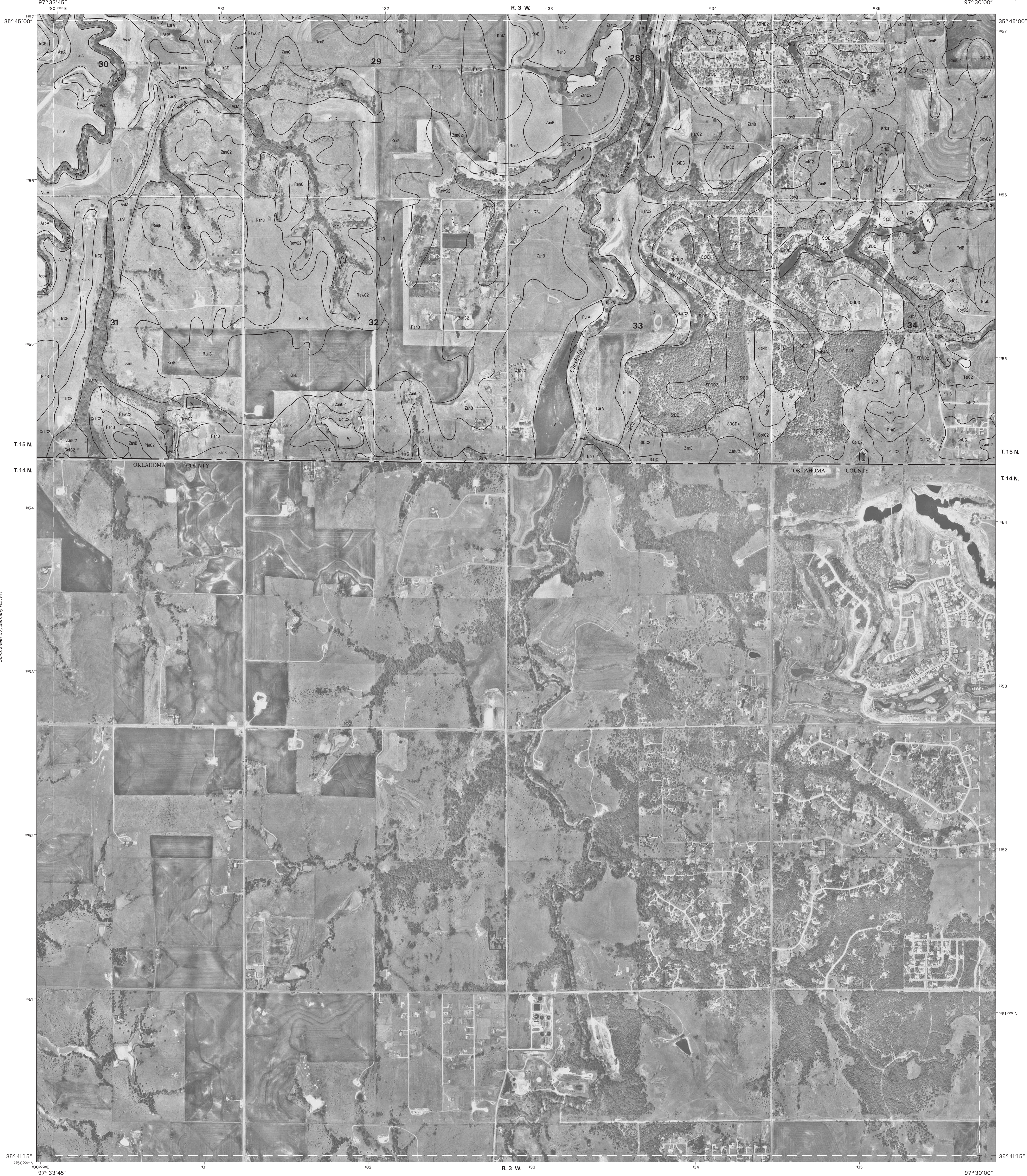


47	48	49	47 CASHION SE
			48 NAVINA SW
			49 NAVINA SE
56		58	56 PIEDMONT NE
			58 BETHANY NE NE

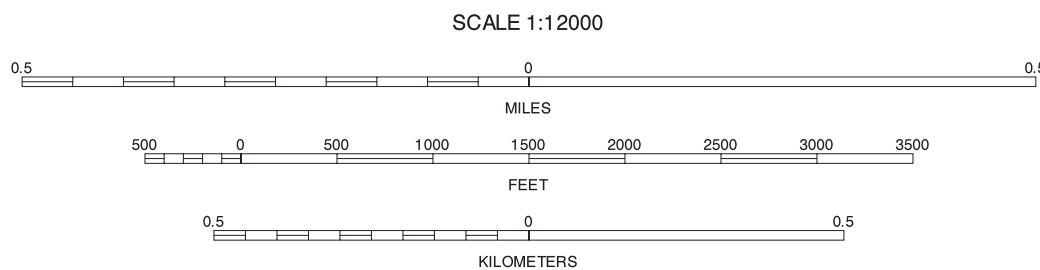
INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





North American Datum of 1983 (NAD83). GRS-80 Spheroid.  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.



48	49	50	48 NAVINA SW 49 NAVINA SE 50 GUTHRIE SOUTH SW
57		59	57 BETHANY NE NW 59 EDMOND NW

## INDEX TO ADJOINING 3.75 MAPS

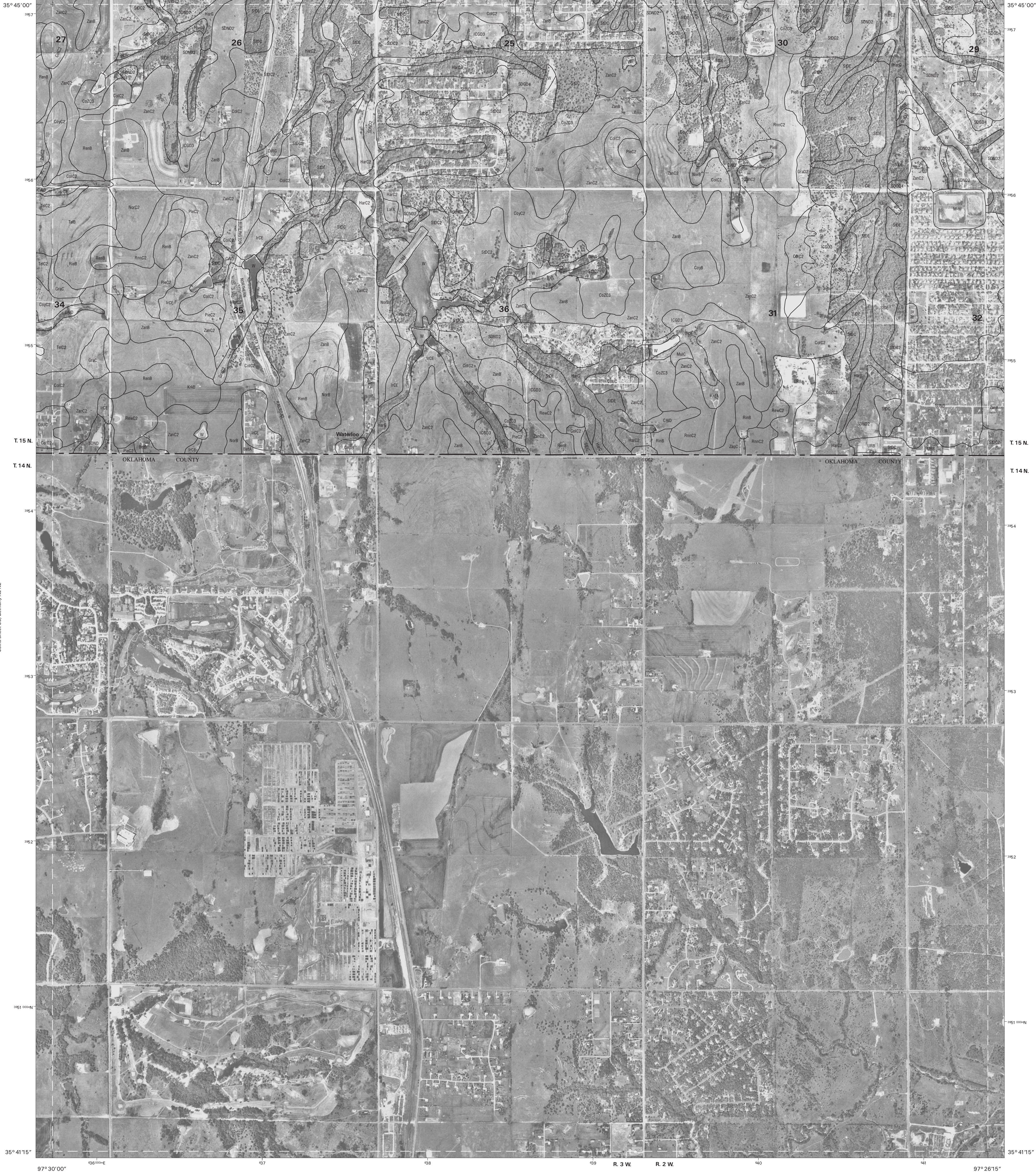
BETHANY NE NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 58 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 49,  
Katharine SE

Joins sheet 51,  
Guthrie South SE



Joins sheet 55, Bethany NE NE

Joins sheet 60, Edmond NE

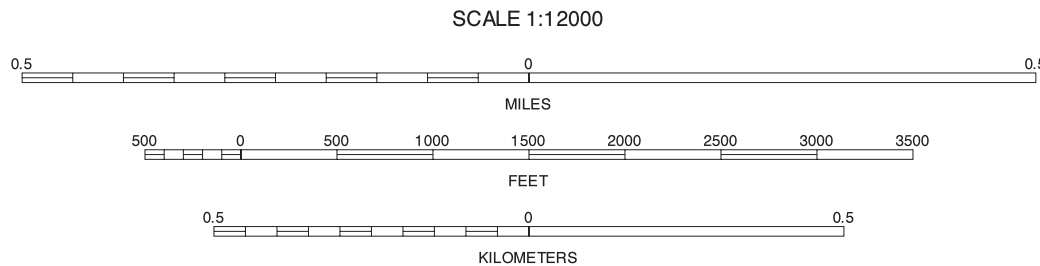
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



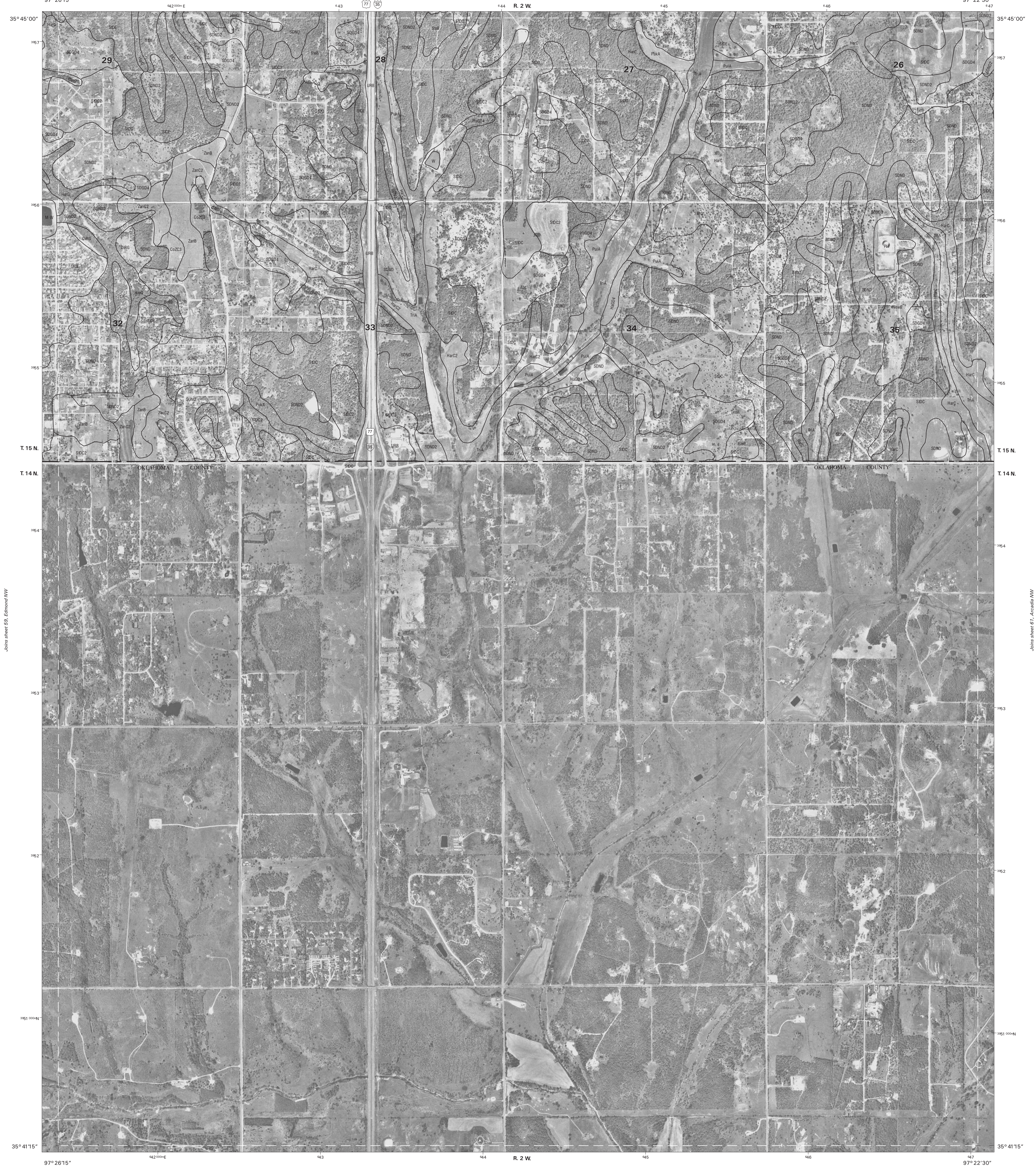
49	50	51
58	59	60

INDEX TO ADJOINING 3.75 MAPS

EDMOND NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 59 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





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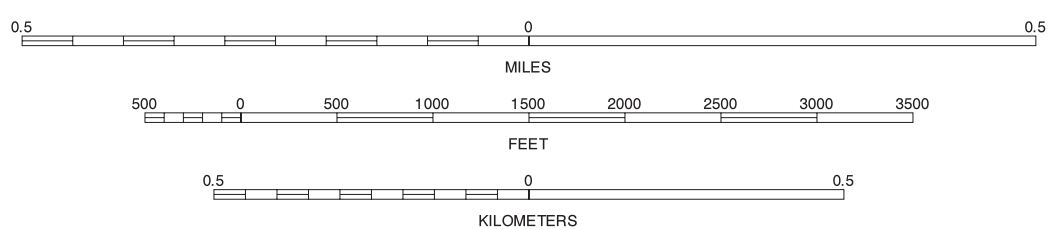
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION

SCALE 1:12000



50	51	52
59	60	61

INDEX TO ADJOINING 3.75 MAPS

EDMOND NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 60 OF 64

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.





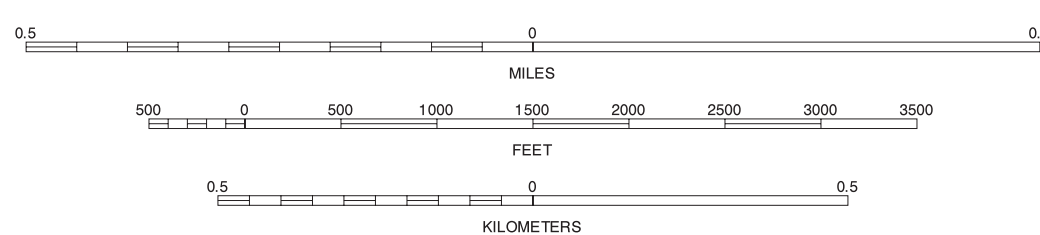
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1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



North American Datum of 1983 (NAD83). GRS-80 Spheroid  
1000-meter ticks: Universal Transverse Mercator, zone 14.  
Coordinate grid ticks and land division data, if shown, are  
approximately positioned. Digital data are available for  
this quadrangle.

INDEX TO ADJOINING 3.75 MAPS

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 52,  
Guthrie SE

Joins sheet 55,  
Meridian SE

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

LOGAN COUNTY, OKLAHOMA  
LUTHER NW QUADRANGLE  
SHEET NUMBER 63 OF 64

Joins sheet 54, Meridian SW



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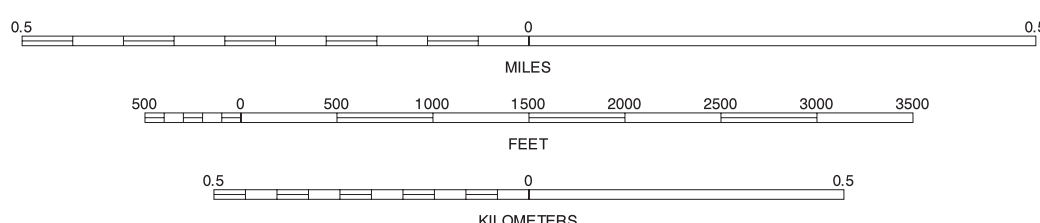
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION

SCALE 1:12000



53	54	55
62	63	64

INDEX TO ADJOINING 3.75 MAPS

LUTHER NW, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 63 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



Joins sheet 54,  
Meridian NW

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 55, Meridian SE

LOGAN COUNTY, OKLAHOMA  
LUTHER NE QUADRANGLE  
SHEET NUMBER 64 OF 64



Joins sheet 63, Luther NW

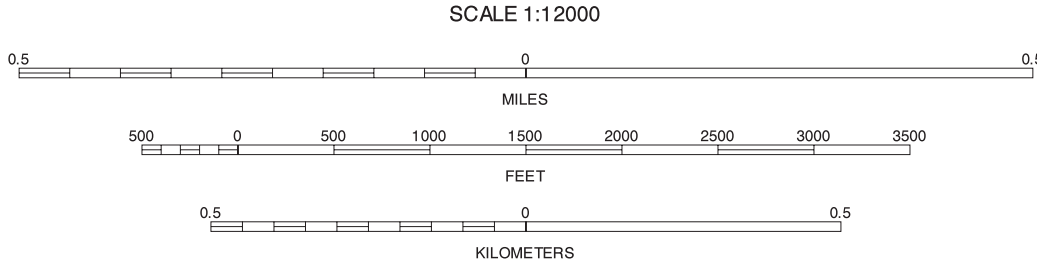
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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE  
LOCATION



54	55	
63		

INDEX TO ADJOINING 3.75 MAPS

54 MERIDIAN SW  
55 MERIDIAN SE

63 LUTHER NW

LUTHER NE, OKLAHOMA  
3.75 MINUTE SERIES  
SHEET NUMBER 64 OF 64

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.